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GPSC

Urban Sustainability Framework (USF)

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Global Platform for Sustainable Cities (GPSC)

URBAN SUSTAINABILITY FRAMEWORK (USF)

FIRST EDITION

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FOREWORD

With the population of cities expected to increase by 2.5 billion between now and 2050, cities face a multitude of challenges. Urban sprawl and transportation congestion are expected to worsen, and the effects of climate change will increase cities' vulnerability to natural hazards and increase the risk of climate-induced displacement. Such consequences affect people's welfare and bring unprecedented challenges to the planet's environmental sustainability.

But urban growth and climate change also create an imperative and offer opportunities to create sustainable cities that meet these challenges. The Global Environment Facility (GEF), the World Bank and other multilateral development banks, the United Nations, and many other organizations are investing in solutions to harness the opportunities associated with global urbanization. They seek to decarbonize the urbanization process, promote resource-efficient growth, build compact cities, and enhance urban resilience. This transformation of cities will drive economic development, create jobs, provide a higher quality of life, and have a positive impact on the global commons.

Towards this end, the Global Platform for Sustainable Cities (GPSC) was launched in March 2016. It was designed to meet the need that many of us saw for an enabling environment—a platform—that allows cities to exchange ideas, share experiences, use analytical tools, and, most importantly, steer investment toward long-term sustainability. Supported by GEF, and led by the World Bank in close collaboration with many existing initiatives, the GPSC assists cities in tapping into cutting-edge knowledge and expertise on topics ranging from urban planning to low-carbon strategy, transit-orientated development, and sustainable financing. Together with various partners in the urban realm, the GPSC is creating a suite of knowledge products and tools that will help cities drive their development agenda.

A key pillar of the platform is to link knowledge to finance so that cities become major hubs for achieving global environmental benefits. The goal is to enable cities to leverage financing to advance their sustainability and resilience agendas, and in particular to work toward the United Nations Sustainable Development Goal 11—making cities inclusive, safe, resilient, and sustainable. By connecting cities with international financial institutions (IFIs), the GPSC helps match projects with financing opportunities and promotes the sustainable implementation of projects.

Since the adoption of the New Urban Agenda in Quito, Ecuador, in October 2016, many IFIs have come together to coordinate an approach that supports city leaders in developing long-term visions and plans, and in utilizing the financing options that can translate those plans into a reality. Today the GPSC is strengthening the IFI network and promote investment in sustainable urban infrastructure.

We are pleased to introduce the **Urban Sustainability Framework (USF)** as a guide for cities seeking to enhance their sustainability. It supports cities as they progress along the sustainability pathway, from creating a vision all the way to identifying financial resources to implement their plans. Its Measuring Framework lays out key enabling and outcome dimensions of urban sustainability: governance and integrated planning, fiscal sustainability, economic competitiveness, environment and resource efficiency, low carbon and resilience, and social inclusiveness. This evidence-based and integrated approach strives to help cities assess and understand where they are in their development, and to support them on the journey toward long-term urban sustainability.

To the cities, organizations, and experts who have contributed to the development of the framework and helped prepare this publication, we would like to take this opportunity to express our appreciation. We are confident that through this collaboration, a shared vision and common approach to urban sustainable development can be forged. We invite cities to use the framework to meet the challenges they face today and in the coming decades, and we enthusiastically look forward to the collaborative efforts to adopt an integrated approach to urban sustainability.

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The world's growing cities are at the leading edge of the global sustainability agenda. How cities choose to respond to challenges can greatly influence the prosperity and quality of life of their residents.

EXECUTIVE SUMMARY

Urbanization's Opportunities and Challenges in the Global Agenda

The world is urbanizing at an unprecedented rate, and more than half the world's population live in cities. Predictions indicate that by 2050, two-thirds of the world's 9.8 billion people will live in urban areas (UN 2015b). The corresponding increase in global urban land cover during the first three decades of the 21st century is expected to be greater than the cumulative urban expansion before the year 2000 (IPCC 2014).

While urbanization presents many opportunities, rapidly expanding cities face a multitude of perils that come in tandem. Economic disruptions, social strife, and environmental disasters are increasingly occurring within their enlarging boundaries. Such occurrences exert huge stresses on often limited infrastructure and public services; according to estimates by the Organization for Economic Co-operation and Development (OECD), governments worldwide will have to spend approximately $71 trillion in total by 2030 to provide adequate overall global infrastructure for electricity, road and rail transport, telecommunications, and water.[1] This is 3.5 percent of the world's annual gross domestic product (GDP) from 2007 to 2030 (OECD 2015). The perils that rapidly expanding cities face, along with subsequent steep funding needs, translate into significant difficulties for many city governments, which often have disproportionately small budgets.

It is often asserted that the battle for sustainable development will be won or lost in cities. Indeed, the world's growing cities are at the leading edge of the global sustainability agenda. How cities choose to respond to challenges can greatly influence the prosperity and quality of life of their residents. City governance and planning initiative failures can exacerbate urban problems—such as socioeconomic inequality, slums and informal settlements, urban sprawl, and the degradation of natural ecosystems—while also exposing the city to the localized effects of global climate change. City governments must therefore make informed decisions about their infrastructure investments based on up-to-date data sources.

It is crucial that cities take advantage of opportunities to enhance sustainability. As they grapple with population growth, advancing rates of urbanization, and the impacts of climate change, it is clear that in the future, cities will need to adopt innovative approaches to support increasing demands by their residents. Cities can be and must become places of innovation and drivers of economic growth, where wealth and jobs are created and resources are used efficiently. The choices that are made about how cities are built, inhabited, and maintained will have long-term global effects.

[1] All dollar amounts are U.S. dollars.
Image: Buddha's Birthday: Cheonggye Stream by Emily Orpin, CC BY-NC 2.0, www.flickr.com/photos/ejorpin/8748812861.

The efficient and effective planning and management of cities enable economies of scale, while also potentially offsetting the negative impacts of global climate change on natural ecosystems.

The world is beginning to realize that cities are dynamic places where positive change can happen rapidly at an unprecedented rate. The international community has harnessed the momentum with several key events, such as the September 2015 launch of the 2030 Agenda for Sustainable Development (UN 2015a). The groundbreaking plan is the first international agreement to acknowledge sustainable urban development as the fundamental precondition for the prosperity of cities. The agreement comprises 17 Sustainable Development Goals (SDGs) and 169 actionable targets that aim to be achieved by 2030. Particularly relevant is the 11th SDG—sustainable cities and communities—which seeks to "make cities and human settlements inclusive, safe, resilient and sustainable" by recognizing urbanization and urban growth as a transformative force for sustainable development (UN 2015a).

Following the launch of the SDGs, the year 2015 also saw the adoption of the Paris Agreement by 195 member states of the United Nations Framework Convention on Climate Change (UNFCCC) as a universal legally binding agreement on climate (UN 2011). In 2016, at the third United Nations Conference on Housing and Sustainable Urban Development (Habitat III), held in Quito, Ecuador, the New Urban Agenda was adopted (UN 2017). This document, which centrally embeds the SDGs within in its discussion, sets out how cities should be planned and managed to best promote sustainable urbanization.

Transforming the Future of Cities

Now that cities have emerged on the global agenda, sustainable urbanization initiatives must take center stage. The Global Platform for Sustainable Cities (GPSC) was launched in 2016 to advance efforts towards this goal. It aims to support, strengthen, and contribute to the worldwide initiatives mentioned above by helping cities translate transnational declarations into city-level actions, with a focus on integrated planning and fiscal responsibility. Bringing together participating cities and a wide range of other entities working on urban sustainability issues, the GPSC creates a shared platform for global knowledge and an evidence-based, integrated approach to achieving worthwhile outcomes.

The Urban Sustainability Framework

The Urban Sustainability Framework has been developed by the GPSC to

- Help build a common understanding of sustainability within an urban context;
- Provide practical guidance to cities on how to pursue urban sustainability through integrated approaches;
- Serve as a policy tool to support cities in collecting and integrating data, and using those data sets to define a vision, set targets, monitor progress, and forecast trends—all while being able to compare themselves with peer cities;
- Establish a common framework to measure urban sustainability so that cities can diagnose and benchmark their current performance, monitor the impacts of their policy and planning interventions, and share data and knowledge with other cities in the GPSC network and beyond.

Functionally, the intention of the USF has been to help cities of all scales and at every possible geographic location. GPSC's membership covers a very diverse group of cities, including megacities with populations of more than 15 million people, relatively small cities with populations of 200,000, high-middle-income cities with an average per

capita income of more than $15,000, and low-income cities with per capita income of less than $2,000. Given this diverse membership, the USF is not intended to be prescriptive in its approach, but rather provides general guidance that can be modified and tailored to the unique circumstances of each city.

Building on the knowledge and experience of previous initiatives, the framework offers an action- and policy-oriented tool for sustainable integrated planning It includes guidelines, good practices, and milestones to enable each participating city to understand its sustainability context, develop a vision for future sustainability performance, prepare a plan to achieve that vision, and implement the sustainability plan through financing and regulatory support. The framework uses a four-stage approach—consisting of diagnosis, vision development, target setting, and monitoring—and includes a road map with indicators at each stage. This approach ensures that in addition to providing guidance on the policies cities should adopt, the USF shows cities with scarce resources and limited capabilities how best to accomplish reforms and make investments.

The USF seeks to be an inspiring guide for cities embarking on a journey toward sustainability, and more broadly to advance the integration, implementation, and coherence of the global sustainability agenda. City governments are the primary audience for USF guidance, while other agencies, institutions, and practitioners may also find the framework useful. The USF document will be periodically revisited and enhanced by way of lessons learned during its use. Knowledge products on specific topics will be issued over time to complement the principles outlined in the USF.

The Urban Sustainability Framework is structured in two parts, along with annexes that explore the good practices of specific cities and organizations and the positive results of their initiatives:

Part I: Understanding and Achieving Urban Sustainability lays out a process for, and practical guidance on, a four-stage approach that includes (1) diagnosis of the city's current situation; (2) definition of a vision for change and establishment of priorities; (3) an approach to financing of the plan that achieves and demonstrates fiscal sustainability; and (4) monitoring and evaluation.

Part II: The GPSC Measuring Framework builds a common understanding of sustainability within the urban context through two "enabling" and four "outcome" dimensions. The enabling dimensions are (1) governance and integrated urban planning, and (2) fiscal sustainability. The outcome dimensions are (1) urban economies, (2) natural environment and resources, (3) climate action and resilience, and (4) inclusivity and quality of life.

Understanding and Achieving Urban Sustainability: Part I's Four-Stage Approach to Integrated Planning

Sustainable cities combine greater productivity and innovation capacity with lower costs and reduced environmental impact. They provide secure and healthy urban environments where both people and nature can thrive. They offer amenities such as affordable housing and vibrant street life while also providing safe and high-quality public spaces. They also provide inclusive access to health care, education, and jobs at walking distance or reachable by short and convenient transit rides seamlessly integrated with pedestrian and bicycle paths. The potential of clean energy and smart technologies are harnessed to increase well-being, reduce environmental impact, and protect ecosystems. A sustainable city preserves its environmental and physical assets for future generations while enhancing its competitiveness. It also has a local government with the fiscal and administrative capacity to carry out its urban functions with active participation from citizens.

To achieve these admirable outcomes, cities face new coordination challenges. Among them are jurisdictional fragmentation due to metropolitan agglomerations that far exceed municipal limits, and the sectoral silos created by the departmental organization of city governments. Both breed contests due to intergovernmental allocation of mandates and mismatched resources.

Many cities around the world are in urgent need of effective planning and financing strategies to meet today's critical urban challenges. Integrated urban planning offers a unique opportunity for cities to realign their growth trajectories to follow a more sustainable, resilient, and inclusive path. In particular, cities need to coordinate land management with infrastructure, natural resources, and hazard risk. Cities need policies to manage the intensity of land use and to ensure its integration with infrastructure development—especially transport (World Bank 2013).

The Urban Sustainability Framework provides tools and methods that cities of different sizes and levels of development can use to improve their sustainability over time. In lower- or middle-income countries, many cities struggle to provide basic infrastructure to their residents while also establishing conditions in which businesses and economies will thrive. However, these cities can make progress toward sustainable urbanization. They should be encouraged by the achievements of cities that struggled in the 1960s—like Seoul or Singapore—which demonstrated that in one generation a high level of per capita income could be achieved by utilizing integrated, resource-efficient, and sustainable planning methods.

With the USF, the GPSC aspires to help cities develop their sustainability vision and action plan. The USF is a tool to support strategic planning and identify priorities. It helps decision makers come to adequate and evidence-based decisions that integrate multiple sustainability dimensions.

The USF's four-stage approach offers cities a road map for improving their sustainability status. The framework recognizes that different cities may be at different development stages but that all can make progress toward sustainability. It sets cities on a trajectory to deliver inclusive growth while reducing the impacts of environmental disasters and climate change. Although each city's action plan will differ in policy priorities, the USF's four stages of integrated planning and cross-cutting processes are broadly applicable, as follows:

Stage 1: Diagnosis. This stage answers the question: *"Where are we now?"* The diagnosis is a process of dynamic, continuous self-analysis. It identifies key capabilities and critical sustainability gaps. It enables cities to respond to emerging trends, events, challenges, and opportunities. To facilitate this stage of planning, the USF encourages cities to integrate their data into planning and policy-making initiatives.

Stage 2: Vision and Priorities for Action. This stage poses the questions *"Where do we want to go?"* and *"How do we get there?"* The vision is oriented toward the future and attempts to foresee how the city could be more sustainable 10 to 20 years from now. This stage invites cities to formulate aspirational goals that give shape to what the city wants to become. The vision should correspond to the city's needs, historical and cultural context, and current position on the sustainability pathway. Priorities for action at this stage are key transformational interventions. To realize the vision, cities should have an effective action plan that outlines measurable targets and milestones, activities and initiatives for implementation, the responsibilities of each actor, and city budget commitments.

Stage 3: Financing the Plan. This stage answers the question: *"How do we finance urban investment necessary for achieving the chosen priorities?"* Financing the priorities for action is critical: the process of

identifying financing options should take place in parallel with the development of a city's vision and priorities.

Stage 4: Monitoring Framework. This stage answers the question: *"Are we doing the right thing, and is our plan working?"* Holistic monitoring and evaluation allows government officials and development managers to learn from past experiences, improve service delivery, and plan and allocate resources, while also demonstrating the results of the initiatives as part of their own accountability. The GPSC promotes a strong focus on measurable results through the use of the USF indicators.

Cross-Cutting Processes. This consideration answers the question: "How are we doing?" The cross-cutting processes of citizen consultation and stakeholder engagement are involved at each stage. The GPSC encourages cities to implement the USF through an inclusive and participatory process. A robust consultation procedure must be part of formulating the vision and action plan to ensure that citizens are committed to the goals and involved in the implementation. Monitoring should ensure transparency, and its results should be made public so that citizens can evaluate the actions undertaken.

A sustainability plan is all the more effective when policies for several goals are bundled. Bundling of policy instruments and a high level of coordination across institutions can increase the likelihood of achieving sustainability goals. According to initiatives such as the UN-Habitat City Prosperity Initiative,[2] the most prosperous sustainable cities are the ones that perform equally well in all dimensions of sustainability and that have successfully integrated planning, governance, and finance (UN-Habitat and International City Leaders 2015).

GPSC's Measuring Framework: Part II's Enabling and Outcome Dimensions

The GPSC aims to help cities leverage opportunities arising from urbanization through an integrated approach to urban planning and financing. It has interpreted the critical outcomes and themes enshrined in the SDGs, the New Urban Agenda, and the Paris Agreement through the lens of the GPSC priority areas—that is, the integrated approach to urban planning, action, and financing.

At the heart of the USF is its Measuring Framework, which aims to enhance the understanding of urban sustainability and promote evidence-based integrated urban planning through **six dimensions of sustainability.** These include **two enabling dimensions** (table ES.1) and **four outcome dimensions** (table ES.2).

Table ES.1. Enabling Dimensions and Associated Goals

ENABLING DIMENSIONS		GOALS
1.	**Governance & integrated urban planning**	Achieve integrated, well-planned urban development
2.	**Fiscal sustainability**	Ensure accountable governance and fiscal sustainability

Table ES.2. Outcome Dimensions and Associated Goals

OUTCOME DIMENSIONS		GOALS
1.	**Urban economies**	Attain sustainable economic growth, prosperity, and competitiveness across all parts of the city
2.	**Natural environment & resources**	Protect and conserve ecosystems and natural resources into perpetuity
3.	**Climate action & resilience**	Work toward mitigating greenhouse gas emissions while fostering the overall resilience of cities
4.	**Inclusivity & quality of life**	Work toward creating inclusive cities and improving cities' livability, focusing on reducing poverty levels and inequality throughout cities

[2] Refer to annex A for further information on UN-Habitat's City Prosperity Index.

For organizational purposes, the Measuring Framework identifies separate dimensions of urban sustainability and aligns subsidiary key focus areas with indicators. However, sustainability is a complex, multidimensional concept that cannot be effectively addressed without acknowledging the relationship between different city functions and systems. The six dimensions and goals are interrelated. Policies and actions that impact one goal are likely to have additional impacts on other goals. For this reason, it is essential that an integrated approach to urban sustainability is adopted by cities. Such an approach recognizes the interrelationships between dimensions and seeks to maximize synergies between city systems and functions to reduce inadvertent negative impacts on other aspects of a city.

Recommended Action by Cities

Cities are where development challenges and solutions meet. The USF provides a framework to help city leaders make informed decisions for sustainable development in their cities and address key challenges.

The GPSC encourages cities to use the USF as an action-oriented tool for finding sustainable solutions to their challenges. It encourages city leaders to look at their city and assess its sustainability status; to create a vision for its future, supported by an action plan with clear priorities and a monitoring process; and to look at how integrated planning and financing can be coordinated to support sustainable urbanization. City leaders can use the USF to tailor the analysis of their city's strengths, weaknesses, threats, and opportunities; to shape their vision for the future; and to identify their priorities.

Rapid urbanization confronts city governments with unprecedented governance, planning, and fiscal challenges across the spectrum of urban sustainability. How decision makers prepare for rapid urbanization is crucial, not only to the future of their cities, but also to global economic progress and sustainability. City leaders must urgently develop a vision for their city's future in consideration of their city's unique path for economic growth, environmental protection, climate impact and resilience, and inclusiveness. This vision must be built upon integrated planning that utilizes a multidimensional framework, such as the USF.

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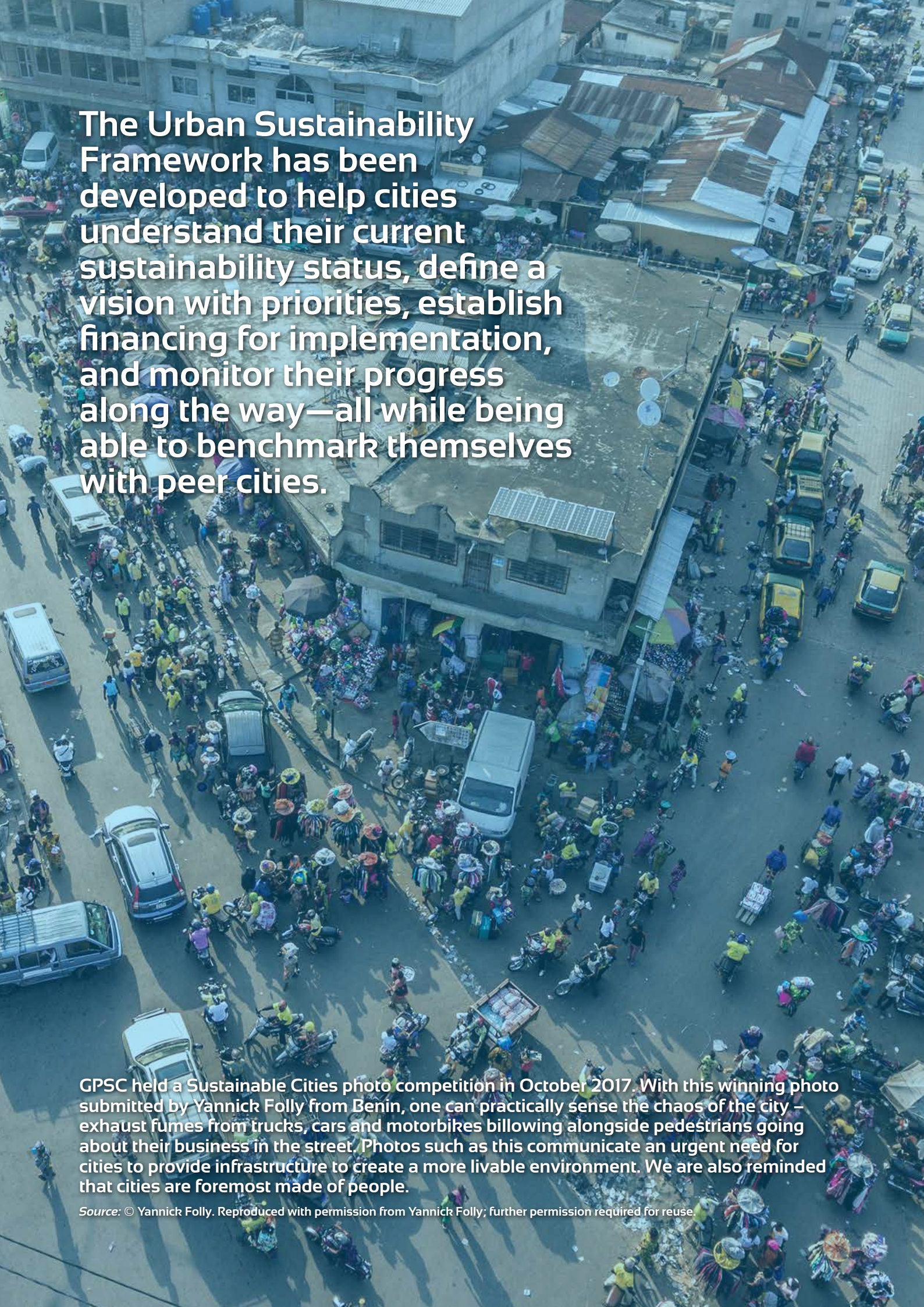
ABBREVIATIONS

ADB	Asian Development Bank
CIP	capital investment plan
CPI	City Prosperity Index
CPL	City Planning Labs
CRI	City Resilience Indicators
CSAC	Centre for Sustainable Asian Cities
EBRD	European Bank for Reconstruction and Development
ESCI	Emerging and Sustainable Cities Initiative
FAR	floor area ratio
FDI	foreign direct investment
FIES	Food Insecurity Experience Scale
GDP	gross domestic product
GEF	Global Environment Facility
GHG	greenhouse gas
GIS	geographic information system
GPSC	Global Platform for Sustainable Cities
GSURR	Global Practice for Social, Urban, Rural, and Resilience
GVA	gross value added
IDB	Inter-American Development Bank
IFC	International Finance Corporation
LRG	local or regional government
MRT	mass rapid transit
MSE	micro and small enterprise
MURNInets	Malaysian Urban-Rural National Indicators Network on Sustainable Development
NUS	National University of Singapore
OECD	Organisation for Economic Co-operation and Development
PPP	public-private partnership
PSR	pressure-state-response
PwC	PricewaterhouseCoopers
SDG	Sustainable Development Goal
S&P	Standard & Poor's Financial Services
SWOT	strengths, weaknesses, opportunities, threats
TNUDF	Tamil Nadu Urban Development Fund
TNUIFSL	Tamil Nadu Urban Infrastructure Financed Service Limited
ULB	urban local body
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USF	Urban Sustainability Framework
WCCD	World Council on City Data
WHO	World Health Organization
WSPF	Water and Sanitation Pooled Fund



The Urban Sustainability Framework has been developed to help cities understand their current sustainability status, define a vision with priorities, establish financing for implementation, and monitor their progress along the way—all while being able to benchmark themselves with peer cities.

GPSC held a Sustainable Cities photo competition in October 2017. With this winning photo submitted by Yannick Folly from Benin, one can practically sense the chaos of the city – exhaust fumes from trucks, cars and motorbikes billowing alongside pedestrians going about their business in the street. Photos such as this communicate an urgent need for cities to provide infrastructure to create a more livable environment. We are also reminded that cities are foremost made of people.

Source: © Yannick Folly. Reproduced with permission from Yannick Folly; further permission required for reuse.

PART I: UNDERSTANDING AND ACHIEVING URBAN SUSTAINABILITY

The guidance contained in part I of the Urban Sustainability Framework (USF) is targeted to help city governments and their partners address the following fundamental questions:

- Where are we now?
- Where do we want to go—that is, what are our priorities?
- How do we get there?
- How do we finance the investment needed to achieve the priorities?
- How are we doing?

The answers to these questions are explained within the following three sections of part I:

1. **What Is a Sustainable City?** This section lays out the six dimensions of a sustainable city and defines sustainability at various levels of urban development
2. **A Four-Stage Approach to Achieving Urban Sustainability.** This section lays out the key principles of integrated planning and describes the four stages for achieving urban sustainability
3. **Summary of USF's Assistance to Cities.** This section includes GPSC's recommendations for action by cities.

1. What is a Sustainable City?

A city is enabled to achieve sustainability by using two important methods, which the USF calls ***enabling dimensions:*** (1) good governance and integrated urban planning processes; and (2) sound management of city finances to ensure financial sustainability.[3]

Sustainable cities demonstrate the following four key outcomes, which the USF calls ***outcome dimensions:*** (1) robust economic growth, prosperity, and competitiveness across all parts of the city; (2) protection and conservation of ecosystems and natural resources into perpetuity; (3) mitigation of greenhouse gas (GHG) emissions while fostering overall city resilience; and (4) inclusiveness and livability, mainly through the reduction of city poverty levels and inequality.

A sustainable city is a compact, relatively densely populated mixed-use urban form that creates efficiency gains. It combines greater productivity and innovation capacity with lower costs and reduced environmental impact. It provides secure and healthy urban environments where both people and nature can thrive, and offers residents affordable housing, vibrant street life, and safe and high-quality public spaces. A sustainable city provides inclusive access to health care, education, and jobs at walking distance or reachable by short and convenient transit rides seamlessly integrated

[3] The four outcome and two enabling dimensions are further elaborated in part II.

Image: Panoramic bird's eye view of Bishan Park and housing estate from Ang Mo Kio by Jimmy Tan, CC BY 2.0, www.flickr.com/photos/jimmytst/10454662843.

with pedestrian and bicycle paths. It harnesses the potential of clean energy and smart technologies to increase well-being, reduce environmental impact, and protect ecosystems. A sustainable city preserves its environmental and physical assets for future generations while enhancing its competitiveness. It also has a local government with the fiscal and administrative capacity to carry out its urban functions with active participation from citizens.

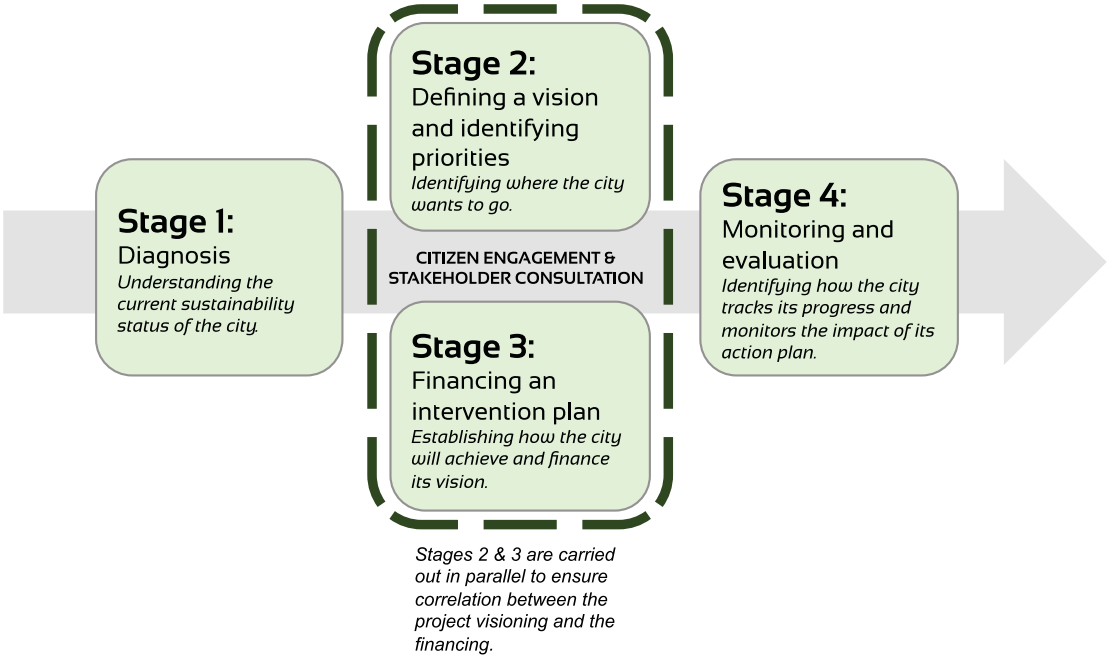
Across the world, cities are placing themselves on a path toward sustainability and implementing innovative ideas to efficiently manage urbanization. Cities such as Copenhagen, New York, Singapore, Seoul, Curitiba, Cape Town, and hundreds of others have led the way in sustainable urban development and are creating a vision of sustainable cities of tomorrow. Annex B provides examples of how cities such as Seoul and Singapore have progressed on their sustainability pathway, from struggling to meet the basic urban services standard in the 1970s to achieving sustainability that attracts investment and provides a high living standard for citizens today.

2. A Four-Stage Approach to Achieving Urban Sustainability

Many cities are in urgent need of effective planning and financing strategies to meet today's critical urban challenges. The USF's four-stage approach offers cities a road map for improving their sustainability status. It contributes to setting cities at different development stages on a trajectory that delivers inclusive growth while reducing pressure on the environment and mitigating climate change impacts.

Every city is unique. Thus, what matters to the long-term sustainability of one city will be different from what matters to the next city; this variation reflects different contexts, challenges, and political priorities. However, a common process, summarized in figure 1, can be applied within all cities to help guide decision making and to establish and implement a cost-effective sustainability agenda. This process is designed to be flexible enough to respond to short-term needs while taking a long-term view of development.

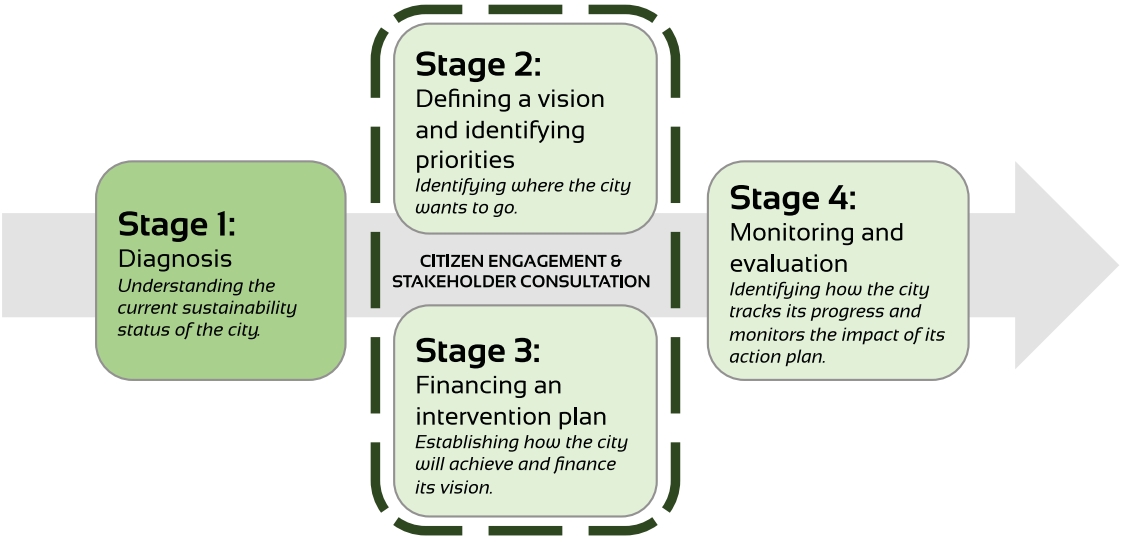
Figure 1. The Four Stages of the USF Process



The USF process is intended to help cities develop a common understanding and vision, build commitment across a diverse range of stakeholders, streamline effort, and inform monitoring and evaluation of the impact of interventions in moving the city toward desired outcomes. The USF does not provide a prescriptive, step-by-step methodology but instead sets out a flexible process through which cities can advance urban sustainability in a way that meets their own needs and priorities. It includes considerations for how cities can identify interventions to enhance existing processes, strategies, plans, and initiatives and thus leverage the most value from work already undertaken. The guidance includes callout boxes to highlight more detailed information, such as tips or references to other resources. Case studies are also highlighted throughout.

Financing is a key policy pillar that should be undertaken in parallel to developing the vision. Financing entails finding sources for the capital outlays needed to achieve the vision and to provide infrastructure and services as the city grows. A vision that does not fully consider its financing implications cannot be realized.

Stage 1: Diagnosis



The building blocks of the USF's diagnosis stage can be thought of as a pyramid. The foundational information for the diagnosis process is the city's data. Building upon the data are the indicators. At the top of the pyramid are the city's polices, which rely on both the data and indicators for stature.

The diagnosis process is first facilitated by the USF's identification of the key focus areas that are globally relevant to the urban sustainability agenda. Each area provides a starting point for cities seeking to determine the scope of their diagnosis assessments. Each category starts by listing a question, which provides guidance on what the diagnosis stage should aim to determine. Cities may wish to augment these key questions with more details specific to their own context.

During the diagnosis process, establishing an understanding of current conditions can serve several purposes for city decision makers. Specifically, it can:

- Build a shared vision to support decision making;
- Drive improvement in performance by setting a baseline from which to assess change;
- Shed light on the impact of actions, so decision makers can expand, modify, or redirect resources and effort to more effectively achieve desired outcomes;
- Identify strengths and weaknesses as well as assets (such as hard infrastructure or intangible resources) that can be leveraged to support interventions;
- Identify interconnections, co-benefits, synergies, or trade-offs between city systems that can help guide efficient use of resources; and
- Explore gaps in awareness and opportunities for action.

However, in most cities, understanding current conditions can be challenging. Therefore, the USF has divided the first stage into manageable steps that start with building the database, then elaborates on the selection of indicators, and finally explains the data analysis process.

Stage 1.1. Building a Database

City leaders are beginning to understand that data, and the infrastructure to analyze them, will become as important to the well-being of their citizens as the power grid and the transportation system. More and better data could, for example, help governments ensure that services in poor neighborhoods are as good as those in wealthy ones.

Collecting and Managing Data

Data form an essential part of evidence-based planning, with indicators serving as an interface between policies and data to show policy makers how and where they should target their efforts. Thus, collecting data for the diagnosis assessment is a first step in a process that should lead to integrated data management along all stages of the USF, from assessment to monitoring. That is why data are described here not in isolation but as a comprehensive integrated system that requires long-term management. Cities rely on a complex web of institutions and networks, which function as systems within systems. Integrated urban data processes promote coordination between government bodies and key stakeholders to support effective knowledge sharing and robust decision making. Promoting integrated, inclusive data processes helps to ensure that data sets are coordinated (reducing the risk of conflicting information and reducing duplicate effort), up-to-date (reducing the risk of basing decisions on old information), and accurate (reducing the risk of inaccurate data that lead to misinformed decisions).

It is important to select a data collection method appropriate to the type of data required for indicators. Quantitative data deal with quantities, values, or numbers and are usually expressed in numeric form. They can be measured at a single point in time or in a time series that reveals trends. Geospatial data deal with the distribution of indicators across the city space (for example, densities of people and jobs, concentration of firms, numbers of jobs accessible by transit in a given time from different city locations, housing and infrastructure at risk). They usually are shared in the form of maps, but the underlying data are in numeric and spatial geographic information system (GIS) formats. Qualitative data tend to be judgement-based and are usually descriptive rather than numeric. These types of data can be gathered through methods such as face-to-face personal interviews, surveys, focus groups, expert panels, document revision, observation, and case studies.

An important part of collecting data is the consideration of how to manage data processes, such as quality assurance, security, backup, procurement, and completeness auditing.

Key questions cities should consider when establishing a data governance management plan include the following:

- *How will the city manage quality assurance of data?* There may be instances when more than one data set could fulfill a reporting requirement, or the team may encounter data sets with conflicting results.
- *How will the city manage issues such as data security and privacy?* The indicator framework represents a comprehensive view of a city's performance across a range of topics, and requires a large volume of data, some of which may be sensitive for a city.
- *How will the city ensure data are auditable and backed up for future reference?* The city's monitoring program should extend over a meaningful period of time to reveal changes in the city's performance (creating a trajectory), and it should measure future progress against and enhance city's ability to build sound strategies and plans for a strong future.

Box 1. Boston CityScore

CityScore is an online tool that uses a number to indicate Boston's overall performance as a city. The platform combines scores from 21 different metrics tracked by the city, ranging from the prevalence of serious crimes compared to historical data, to the timeliness of pothole repairs, to the number of active library users. A value greater than 1 means that the performance is better than Boston's target; anything less than 1 indicates the city's performance is below the target. Scores for the past day, week, month, and quarter are published on the city's website so that anyone can see the up-to-date performance information.

The creation of CityScore was inspired by the idea that a city, like a baseball player, should have a batting average (Bidgood 2015). It was launched in January 2015, and the numeric scores immediately brought attention to city services that were not performing up to expectations, and helped them receive more attention and resources.

An early example was emergency medical services, which had increasing response times. When the mayor sought the reason for this, he learned that both the city's population and the number of visitors had been increasing over time, meaning that the number of emergency calls had increased as well. However, the funding to support additional ambulance services had not been correspondingly raised. Based on this new understanding of the city's needs, the mayor was able to quickly dedicate additional financial resources to improve emergency response times.

The platform has been successful because it integrates the data tracked by the city. Municipal government computer systems may not be organized in a way that allows easy access to the data, which is needed for a platform such as CityScore, or the data may be stored in separate databases. To make a platform such as this perform, it is crucial that different municipal departments work together, but the coordination and data collection effort for the task is often underestimated.

The success of this platform demonstrates the growing trend among municipal governments in the United States toward what is sometimes called data-driven governance. As part of this approach, cities seek to leverage data to increase efficiency while also keeping residents informed of its performance. To achieve these goals, cities leading the trend, such as Boston, Los Angeles, New York, and Houston, have begun using the ever-increasing amounts of data they collect to improve their planning, deliver better services, and engage citizens. The approach requires performing data analytics on information from vastly different functions of a city (Bidgood 2015).

The story of CityScore demonstrates that cities can use the data they collect and manage to improve performance results. Its success thus far is likely to inspire other cities to do the same.

Source: City of Boston, "CityScore," https://www.boston.gov/cityscore.

- *What procedures will the city need to put in place to manage the process for data procurement?* To complete the reporting for indicators, it may be necessary to purchase data from private companies or institutions.
- *How will the city manage the reporting assignment, review, and approval process?* Review and approval of data reporting may require sign-off or approval from several key stakeholders to ensure consistency.

Considering these issues in advance will help the city deliver a robust, transparent, credible, and accountable assessment to inform decision making.

Cities need to play an active role as brokers of urban data. This entails more than sharing reams of their own administrative information, as several cities round the world already do. Municipal governments ought to become the guardians of the local information system, designing a framework that encourages others to share data and supply services to citizens. For example, they might act as a portal for information from utilities and online companies, while simultaneously protecting privacy and making certain that the algorithms used don't discriminate against specific groups of individuals.

Some cities are beginning to assume this role. A prime example is Boston's data sharing partnership with Waze to reduce traffic congestion. In exchange for some data from the service, the city quickly informs Waze of any planned road closures. Boston also uses CityScore to manage its urban data (box 1). Chicago, meanwhile, has launched OpenGrid, a website that allows users to view public urban data using online maps.

Utilizing Technology for Data Collection and Geospatial Analysis

Traditional sources of urban data include the latest population census, public service company records, reports of other international bodies, and academic research. New technologies such as the remote sensing and development of GIS analytical tools have considerably enriched the potential of data for understanding cities.

Geospatial analysis is the collection, display, and manipulation of imagery (such as aerial or satellite photographs and images) and data (such as historical data records) explicitly in terms of geographic coordinates, or implicitly in terms of a street address, postal code, or other locational identifiers. Geospatial analysis enables the creation of maps, graphs, statistics, and other products that can illustrate complex relationships in a more easily accessible visual format and support future scenarios. Applying geospatial tools to complex urban data allows for a more granular understanding of many of the indicators.[4] By disaggregating their values at fine intra-urban scales as well as broader regional scales, analysis can explore the relationships between urban systems and networks. Box 2 lists some of the geographic tools used for collecting urban data, while box 3 suggests the contribution of new technologies and analytic tools to strengthening city planning capacity in Indonesia.

However, implementing robust geospatial tools and mechanisms can be a complex process and costly for a city, especially in the developing world. When investing in any of the tools described here, the city must also invest in the human resources necessary to obtain that tool's full benefit. Thus, prioritization of tools and methodologies must take into account their acquisition and operating costs, training requirements, and implementation complexity. Setting out a clear strategy for what data is a priority to collect, and then having a coordinated plan as to how to effectively analyze, is very important.

Box 2. Geographic Tools for Urban Data Collection and Indicators

Geospatial tools are increasingly being used to carry out spatial planning as well as transport and economic planning. They also help cities understand with much greater precision the interrelationships of urban systems that affect their sustainable agenda. Examples of geospatial tools and capabilities available to cities include:

- Remote sensing analysis of the urban ecosystem and ecosystem services;
- Mapping of urban characteristics and patterns;
- Mapping of infrastructure and key public assets;
- Predictive modeling;
- Multi-hazard probabilistic risk assessment;
- Land use mapping based on high-resolution imagery;
- Future built form mapping through high-resolution imagery; and
- Multicriteria suitability analysis.

[4] The tools discussed here are those with the broadest applicability to urban sustainabilityII.

Box 3. World Bank's City Planning Labs in Indonesia

Indonesia will have 68 percent of its population living in cities by the year 2025 (World Bank 2016a). The country's rate of urbanization is one of the fastest in the world; from 2000 to 2010, the extent of Indonesia's urban area grew by more than 1,100 km^2—an increase exceeded only by China (World Bank 2016b). Anticipating a high rate of urban growth in the future, Indonesia is seeking to better position its cities by utilizing evidence-based data analysis to inform spatial planning decisions.

However, may Indonesian municipalities are unfamiliar with systematic data collection and sharing, and have limited infrastructure to process, manage, and host data. To assist Indonesia in strengthening its data capacity so it is able to leverage urbanization's benefits, the City Planning Labs (CPL) program was established by the World Bank and funded by the Indonesia Sustainable Urbanization Trust Fund (World Bank 2016b). The initiative provides technical assistance, shares different international development experiences, and makes available financing solutions for the implementation of development projects (Singh, Raghupathy, and Volosin 2016).

Indonesia's government understands what is needed to enact the integrated planning approach that the CPL program is facilitating. "Good city planning will require good statistical and geospatial data which at present are kept in various government agencies," says Arifin Rudiyanto, who deals with regional development at Indonesia's National Planning Agency. Doni Widiantono, who is the director general of planning for the Ministry of Agrarian and Spatial Planning, admitted, "We are rich in data but poor in information"—a reference to the fact that different government entities control different data sets (World Bank 2016a). To implement an integrated planning approach, aligning the stakeholders and creating a data strategy for implementation are key.

The CPL program initially set up labs in two Indonesian cities: Denpasar, Bali, and Semarang, Central Java. At the city level, the program aims to develop a spatial information strategy for each participating city that sets up processes and procedures allowing government stakeholders to interact, such as through a GIS platform for collecting and sharing data. It also seeks to build the technical skills of staff to manage the technologies. The program plans to create a Municipal Spatial Data Infrastructure model to help scale up the method and technology to a wide range of Indonesian cities (Singh, Raghupathy, and Volosin 2016).

One sample project initiated by Semarang's CPL team conducted data analytics to inform the city's medium-term plan. The analysis considered factors such as the city's water supply network, health centers, schools, green spaces, and poverty rates, as well as the implications of land area reduction due to subsidence. The results have allowed planners to see more clearly how the city's infrastructure gaps relate to issues such as poverty and the physical challenges of land subsidence (World Bank 2016a). Although the analysis was done for Semarang, the method used will offer wider benefits when it is shared with Indonesia's many coastal cities.

For Indonesia's cities experiencing the effects of rapid urban expansion, the scale-up of the CPL program will enable them to address the challenges that urbanization presents and to take advantage of the opportunities it offers.

Stage 1.2. Measuring What Matters: Selecting Indicators for City Priorities

The aphorism "You cannot manage what you cannot measure" is particularly true for and relevant to cities. In order to decide where you want to go, you first need to know where you are, and selection of the right indicators is an important step in the process. For instance, sustainability indicators are important tools for diagnosing urban problems and pressures, and thus for identifying areas that require intervention. Since data are a fundamental component of evidence-based planning, the chosen indicators are effectively the interface between the data at hand and the policies envisioned (ADB 2001). Therefore, indicators are an important component of the GPSC program.

The GPSC's Measuring Framework (described in part II) provides a comprehensive list of key indicators across six sustainability dimensions. Cities can select those indicators that are most relevant and measurable within the city's specific context. They can thus tailor the diagnosis assessment across the key focus areas and ensure it is relevant to different stakeholders.[5]

While each city will determine what is important to its own decision making, the following issues are broadly applicable to all:[6]

- Reasonably estimated sustainability impacts, risks, or opportunities identified through sound investigation by people with recognized expertise, or by expert bodies with recognized credentials in the field;
- Main sustainability interests and topics, and indicators identified by stakeholders (such as vulnerable groups within local communities, civil society);
- Main topics and future challenges for cities reported by peer cities and/or partner organizations;
- Relevant laws, regulations, internal and external policy drivers, and agreements with strategic significance to the city government and city stakeholders;
- Key city values, policies, strategies, operational management systems, goals, and targets (such as building on existing city plans, policies, etc.);
- Critical factors for enabling success (such as those relevant to policy makers, investors, financial institutions, etc.);
- The core functions of the city government and the manner in which they could contribute to advancing the sustainability agenda within the city (such as the city government's ability to control or influence a given topic).

Stage 1.3. Understanding Implications: Assessing Trends, Benchmarking, SWOT Analysis, and Scenario Analysis

It is worthwhile to consider that data and indicators by themselves are not meaningful. Once a city has collected data and created a database as explained in stage 1.1, and has selected indicators as explained in stage 1.2, the next consideration is the implication of the indicators. To understand the implications, the data need to be compared to and analyzed with historical data from the same city (the baseline) and data from other relevant cities (the benchmarks). By measuring indicators of current performance and comparing with the baseline and benchmarks, city governments are better positioned to understand their current business-as-usual trajectory and to make evidence-based decisions about interventions that will improve that trajectory.

[5] It is important to note that indicators may differ for different stakeholders (such as city policy makers, credit raters, investors, and community interests). Cities should tailor assessments to provide the most meaningful outputs to targeted stakeholder groups.
[6] The list is adapted from GRI (2013).

Assessing Trends

Baselines establish the year 0 performance of the city against its selected indicators. Through ongoing monitoring, cities can begin to identify trends and evaluate the impact of policies and investment decisions over time (see box 4, which includes an explanation of Copenhagen's long-term evaluation). Past trends have a strong predictive effect, as cities often find themselves locked in certain development patterns; where patterns are harmful or unsustainable, reversing them will require significant regulatory and economic change. For example, continuous and accelerated consumption of land per added inhabitant indicates not only sprawl patterns but also possible local government finance issues if the city relies on land sales for its financing.

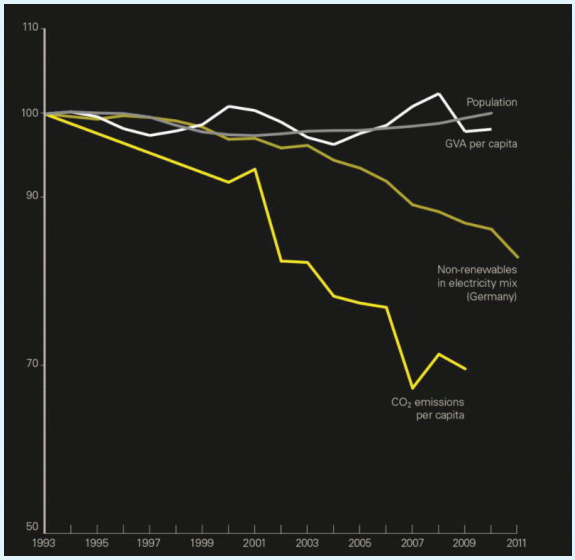
Box 4. Trends in Decoupling Economic Growth from Resource Use and Environmental Impacts

Decoupling economic growth from resource use and environmental impacts entail significantly reducing the material and energy needed to produce one unit of gross value added (GVA). GVA is the measure of the value of goods and services produced in an area, industry, or sector of an economy and equates to output minus intermediate consumption. Such a figure can be appreciated only over one or two decades. Achieving this decoupling requires combined actions on city form, economic sectoral structure, technologies, and human behavior. Green cities across Europe are demonstrating that continued economic and population growth can occur without a commensurate increase in a city's environmental footprint. Figure 2 shows that over the past 20 years Berlin and Copenhagen have achieved rapid decreases in energy use and per capita CO2 emissions, while London and New York have impressive growth in the use of more sustainable modes of transport, such as cycling and public transport.

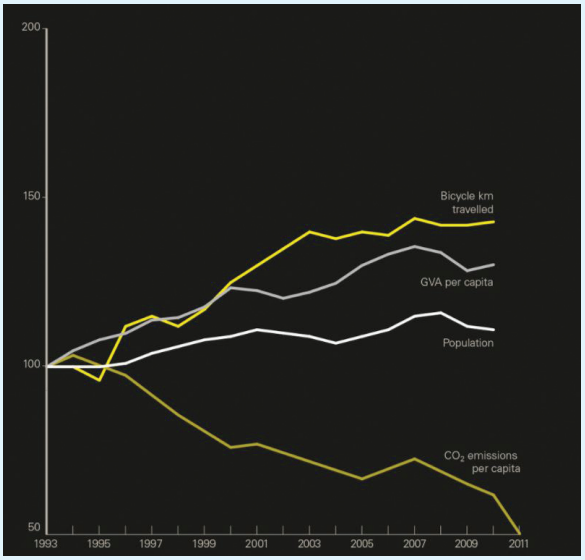
Urban form in Copenhagen, for example, has been strongly influenced by its core spatial strategy, the Finger Plan, which has largely concentrated growth along transit-served corridors separated by substantial green areas. More than half the metropolitan population lives within 1 km of a railway station, and around a quarter within 500 m. These rates compare favorably to denser cities such as London and New York. Mass transit ridership and cycling mobility are high, particularly the latter, where Copenhagen is a global leader.

Copenhagen has been successful in its pursuit of green growth; the Municipality of Copenhagen has halved its carbon emissions since 1993, which now stands at 3.5 metric tons of CO2 per capita, moving the city closer to its goal of becoming carbon neutral by 2025. Replacing coal with biomass for heating and power generation and increasing the use of wind energy have contributed substantially to reducing emissions. The city's progress has been furthered by the increased use of nonmotorized transport; the average number of kilometers traveled by residents with bicycles grew by 43 percent from 1993 until approximately 2010 (LSE Cities 2012b).

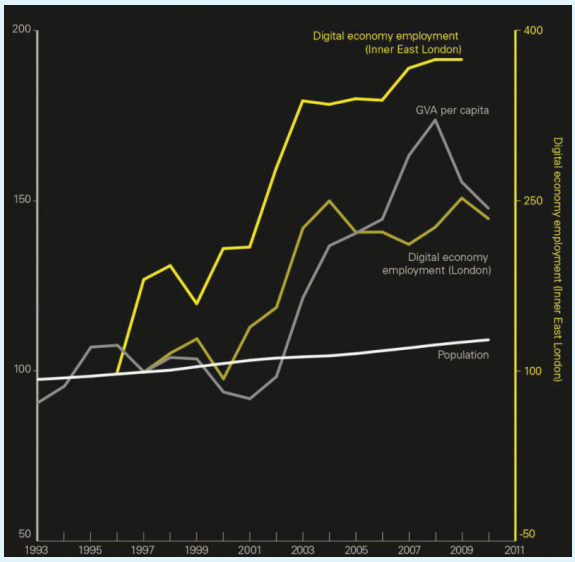
Figure 2. Decoupling in Berlin, Copenhagen, London, and New York



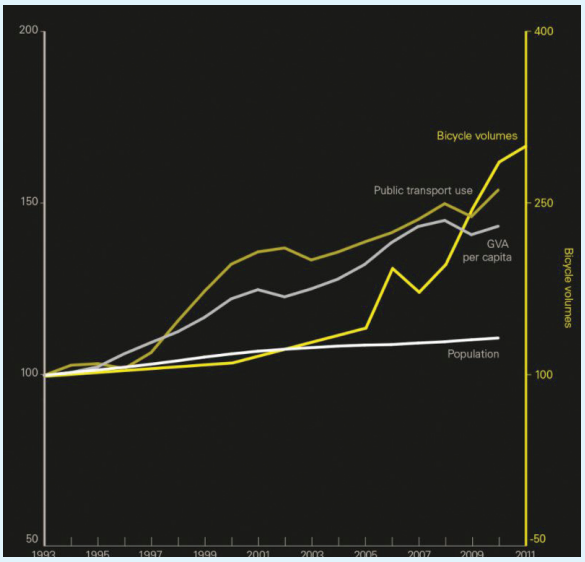
Berlin (All variables are indexed: 1993 = 100)



Copenhagen (All variables are indexed: 1993 = 100)



London (All variables are indexed: 1997 = 100)



New York (All variables are indexed: 1993 = 100)

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Benchmarking

Benchmarking against other cities provides a means to rapidly assess performance. It is therefore particularly well-suited to assessing performance at the diagnosis stage, when a city may just be starting to measure itself using urban sustainability indicators. The process of benchmarking involves comparing the performance of one city to best practice displayed by other cities. Benchmarking helps cities identify good practices used elsewhere that can be adopted to enhance their own sustainability.[7]

Examples of benchmarking techniques include

- Expert input through focus groups (e.g., preselected groups of individuals with diverse technical backgrounds and interest in the city's sustainability program) or panels (e.g., groups of local, national, or international specialists in urban sustainability planning and implementation);
- Comparison with cities in the same region, of the same size, or at the same level of development; or against cities that the city aspires to emulate;
- Comparison with established international standards (where available), such as air and water quality, developed by global or national entities (e.g., the World Health Organization or the U.S. Environmental Protection Agency);
- Review of industry guidance documents and relevant standards; and
- Use of proprietary benchmarking approaches.

Best-practice benchmarking helps cities identify how goals may be reached and, more importantly, what policies and technologies have proved successful in comparable cities. This knowledge allows cities to develop plans to improve or adapt specific best practices, usually with the aim of increasing some aspect of performance. Benchmarking should not be seen as a one-off event, but rather an ongoing process through which cities continually seek to improve their practices.

Evaluating the performance of their peers can help cities set their own goals since it provides a real-life reference point for comparison. In using benchmarks to inform their goals, cities should keep in mind two important considerations:

1. **Regional variations.** There are huge variations in how different regions define sustainability. When selecting best-practice cities to benchmark against, cities should always be mindful of the regional context.[8]
2. **Level of ambition.** Cities should take their capacitiy for change into account. Not every city can or wants to attain world-leading performance. Realities such as resource trade-offs (funding, time, staff, etc.), potentially competing agendas, and politically motivated goals have effects on the level of ambition that is feasible for a city. It is also important to remember, however, that as a city enhances its performance, new opportunities arise that may advance additional goals. Success, even if limited, opens doors to new opportunities.

An explanation of IDB's method of coding indicator benchmark ranges is included in box 5.

[7] Cities can conduct benchmarking self-assessments or work with third-party entities such as universities, nongovernmental organizations, or private sector consultants. Regardless of who conducts the study, a city must interpret the data to understand if they represent good practice, bad practice, or something in between.

[8] For instance, what constitutes a high public transport usage target might not be the same for regions in different continents. In US and Canadian cities, 90 percent of people drive to work, compared to 37 percent in European cities. This is due to the inherent differences in the land use and urban forms of European and American cities.

Box 5. Emerging and Sustainable Cities Initiative: Indicators and "Traffic Lights"

The Inter-American Development Bank (IDB) Emerging and Sustainable Cities Initiative (ESCI) relies on a useful methodology for coding indicators. After the indicator form has been completed, the values are assessed in relation to comparative values such as benchmarks. These comparative benchmarks or values are grouped into three ranges, which are assigned a color according to the following formula: (1) green when the indicator is within the expected parameters; (2) yellow when the indicator has deficits; and (3) red when the indicator is in a critical state. This process, known as traffic-lighting, uses a traffic light color for each indicator to visually represent how near the found value is to the expected range for achieving sustainability in the region.

The indicators for the water topic, with their respective benchmarks, are shown in figure 3.

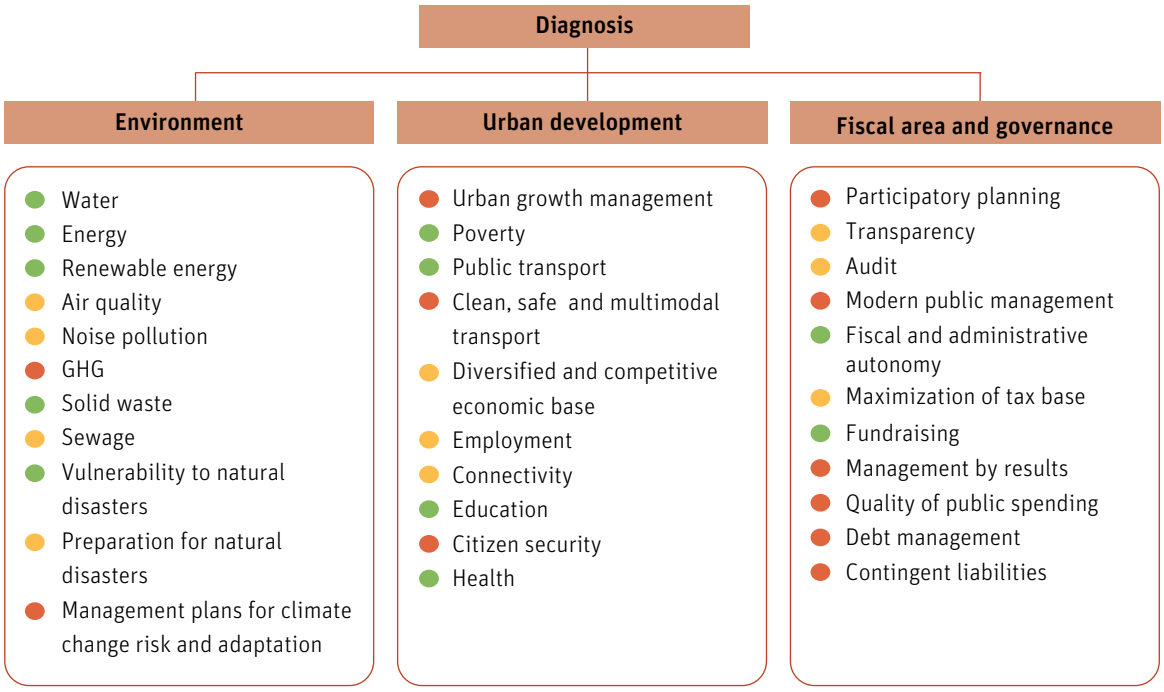
Figure 3. ESCI Water Benchmarks

							Unit of measurement	Theoretical benchmark		
#	Topic	#	Subtopics	#	Indicator	Description		Green	Yellow	Red
1	Water	1	Water coverage	1	Percentage of households with home connections to the city's water network	Percentage of households with home connections to the city's water network	Percentage	90–100%	75–90%	< 75%
		2	Efficiency in the use of water	2	Annual water consumption per capita	Annual consumption of water per capita of people whose homes have a water connection to the city's network	L/person/ day	120–200	80–120 or 200–250	< 80 or >250
		3	Efficiency in the water supply service	3	Continuity of water service	Annual average of daily number of hours of continuous water supply per household	h/day	> 20 h/ day	12–20 h/day	< 12 h/ day
				4	Water quality	Percentage of water samples in a year that comply with national potable water quality standards	Percentage	97%	90–97%	< 90%
				5	Non-revenue water	Percentage of water that is lost from treated water entering the distribution system and that is accounted for and billed by the water provider. This includes actual water losses (e.g., leaking pipes) and billing losses (e.g., broken water meters, absence of water meters, and illegal connections).	Percentage	0–30%	30–45%	> 45%
		4	Availability of water resources	6	Remaining number of years of a positive water balance	Number of years remaining with a positive water balance, considering the supply of available water (taking into account hydrological cycles) and the demand for water (projected uses, including population, industrial sector, ecological flows, etc.)	Years	> 10	5–10	< 5

Each ESCI topic consists of several subtopics and indicators. Hence, the final evaluation of the color assigned to the topic comes from analyzing the final traffic lights for all the indicators included. The main result of this phase is the classification of all the topics with a definitive color, as shown in figure 4.

Finally, for the prioritization process carried out in the next phase, scores are assigned to each topic: topics labeled green receive a score of 1 (low priority), topics labeled yellow receive a score of 3 (medium priority), and topics labeled red receive a score of 5 (high priority).

Figure 4. ESCI Traffic Light Topic Classification



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SWOT Analysis

A SWOT analysis is a study undertaken by an organization (such as a city government) to identify its strengths, weaknesses, available opportunities, and possible threats. The analysis is based on a quadrant matrix, in which strengths and weaknesses (internal factors) are presented above the x-axis, and opportunities and threats (external factors) are presented below. Typically, strengths and opportunities (positive factors) are listed on the left of the y-axis, while weaknesses and threats (negative factors) are listed on the right. A sample SWOT analysis is shown in figure 5.

It is important to realize that the four quadrants of the SWOT analysis are not mutually exclusive; for instance, a weakness can also indicate an area of opportunity. As shown in figure 5, for example, the focus area of "unemployment" may be thought of as a weakness to the city's sustainability agenda, but it also presents opportunities, such as "vocational training and jobs in tourism, health care, and handicrafts."

The framework provides a flexible tool that can be applied quickly, making it particularly powerful for fast, initial diagnosis; it can also be used for rigorous evaluation and more robust assessment.[9] The analysis can employ different methodological scales, including a high-level approach (e.g., a high-level desktop-based review with a small core team) or a detailed approach (which expands the breadth, detail, and robustness of inputs and may include workshopping the known data collected from cities and determining the priorities).

Once the SWOT identification is complete, the city can begin to analyze the results and diagnose implications. Some of a city's strengths—for example, a robust stakeholder engagement process that can help guide city action as well as build support for new plans and efforts—can immediately support the city's sustainability agenda. Others, such as the siloing of city government departments, can obstruct effective action because they prevent topics from being approached in collaborative and holistic ways.

Similarly, there are some weaknesses that limit a city from taking advantage of opportunities, like a poor communications and public relations strategy. Others are more critical. If a city is highly exposed to climate hazards but is unable to enforce building codes, the situation poses a threat to the lives and livelihoods of its citizens. It could also become a threat to the city's attractiveness to investors and businesses if not dealt with quickly.

[9] It is important to realize that a SWOT analysis returns what is put into it; a rapid, cursory assessment will produce results that offer less confidence in guiding significant investment or action than a more detailed, rigorous assessment.

Figure 5. SWOT Analysis Conducted by the Asian Development Bank for Hue, Vietnam

Strengths

- **Geographical location (hub function)**
- Diversity (land, water)
- Naturally preserved areas
- Natural scenery maintained, low pollution
- Ecological assets
- Strong historical and cultural heritage
- **Human capital**
- Education center
- International cooperation and partnerships
- Medical provision and facilities
- **Established brand "Hue"**
- Economic growth in province (10%)
- Well-developed infrastructure (education, water supply, medical)
- Tolerance
- Political commitment
- International airport
- Transport connectivity (also rail)
- Security system
- Developed industries (tourism, textiles, construction materials, [sea]food processing, high tech, beverage)

Weaknesses

- Slow urbanization
- Lack of raw natural and financial resources
- Lack of infrastructure and outdated technologies (drainage, waste treatment, transportation)
- Encroachment into heritage site
- Low climate resilience
- Low capacity in environmental protection
- Lack of planning and preservation of open spaces/natural environment
- Low community awareness for environment
- Rate of deforestation
- "Laid-back" attitude inhibits thrive for development/ innovation
- Unemployment
- **Complexity of government system and management**
- Limited number of investors vis-à-vis potential
- Water bodies not well maintained, with negative impacts on citizens
- Lighting and signage system insufficient
- Dependence on external tourist operators
- Connectivity between tourist destinations

Opportunities

- Support from central government and external donors/investors
- **Tourism center** (and development in other locations)
- Vocational training and jobs in tourism, health care, and handicrafts
- (New) tourism niches (spiritual, etc.)
- Health center development
- Building on the brand
- **Heritage preservation strategy**

Threats

- **Effects of climate change (sea-level rise, etc.)**
- Disaster-prone geographical features
- High construction/ development
- Degradation of heritage sites and shortening of tourist season due to climate change
- Geographical separation of coastline
- Integration leading to intensified (inter-)national competition
- Growth of (facilities in) Da Nang
- Balance between economic growth and heritage preservation

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Scenario Analysis

Scenario analysis is a process of ascertaining and analyzing possible future events by considering possible outcomes under certain conditions (sometimes called "alternative worlds"). When cities set challenging goals concerning trends, they may need to bundle a comprehensive set of policies in an integrated manner. Scenario analysis may be very useful in understanding how to modify established unsustainable trends.

Scenario analysis is frequently used to explore one central question structured around key drivers. More specifically, the analysis explores the implications of the drivers' increasing or decreasing influence on the key indicators. Scenario analysis often incorporates robust modeling to project possible future outcomes in order to inform decisions today. The analysis can serve as a powerful tool for identifying potential future trajectories.[10] Box 6 offers details on scenario analysis in general. Box 7 describes a scenario analysis carried out in Mexico City to understand the impacts of growth to 2050.

Box 6. Urban Growth Scenario Analysis for Planning

Comparing various long-term growth scenarios can provide city planners with a powerful approach to identifying and enacting a pathway to sustainability.

Too often, growth occurs in a city without a comprehensive understanding of the associated challenges, opportunities, and impacts this growth creates. Infrastructure investments, housing policies, land use patterns, and environmental issues are frequently treated independently and in a reactive manner, even though they are interdependent and interact in complex ways with many other social, economic, and environmental factors. Growth scenario modeling and analysis can help cities understand the comprehensive impacts of different growth and policy scenarios across a range of key indicators, such as land consumption, air quality, infrastructure costs, mobility, health, equity, energy consumption, carbon emissions, and quality of life.

Two types of scenario are particularly useful for implementing sustainability frameworks: a trend scenario and an intelligent growth scenario. A trend scenario represents potential future land cover patterns (including urban footprint) under a business-as-usual scenario—that is, if current and recent patterns and dynamics continue unchanged. An intelligent growth scenario represents future development patterns assuming a policy and investment emphasis favoring more efficient use of existing resources and installed infrastructure.

Both scenarios often identify similar elements, and include the following:

- The network of natural areas to be protected and preserved by the city (sometimes referred to as "green infrastructure");
- Areas that ought to be the focus of renewed efforts of development, such as areas already served by infrastructure and public facilities and having the capacity to serve more people, thus avoiding the high capital and environmental costs of unnecessary infrastructure expansion (for example, empty or underutilized lands that could support development with minimal infrastructure costs); and
- Areas where existing development may be at risk due to climate change and other natural or human-made hazards.

[10] See Wilkinson and Kupers (2013).

Box 7. Mexico City Urban Growth Scenario

Mexico City has experienced significant economic growth in recent decades, with a growing middle class fueling a diversified knowledge-based economy. However, the city faces significant environmental, social, fiscal, and governance challenges as it seeks to grow and prosper in the coming decades. To better understand these challenges, Calthorpe Analytics has partnered with the Mexican nongovernmental organization Centro Mario Molina to adapt its RapidFire model to the city.

Scenarios have been developed to test the impacts of growth until 2050. The "trend" scenario depicted growth based on land development and investment trends of past decades; two alternative scenarios—a "moderate" scenario and a "vision" scenario—explored the impacts of aligning housing and employment growth with the expansion of public transit infrastructure and better coordination of jobs and services with housing sites across the region. The scenarios also tested the impacts of adopting more automotive-oriented urban models as opposed to more walkable urban designs and street patterns. The results are shown in figure 6.

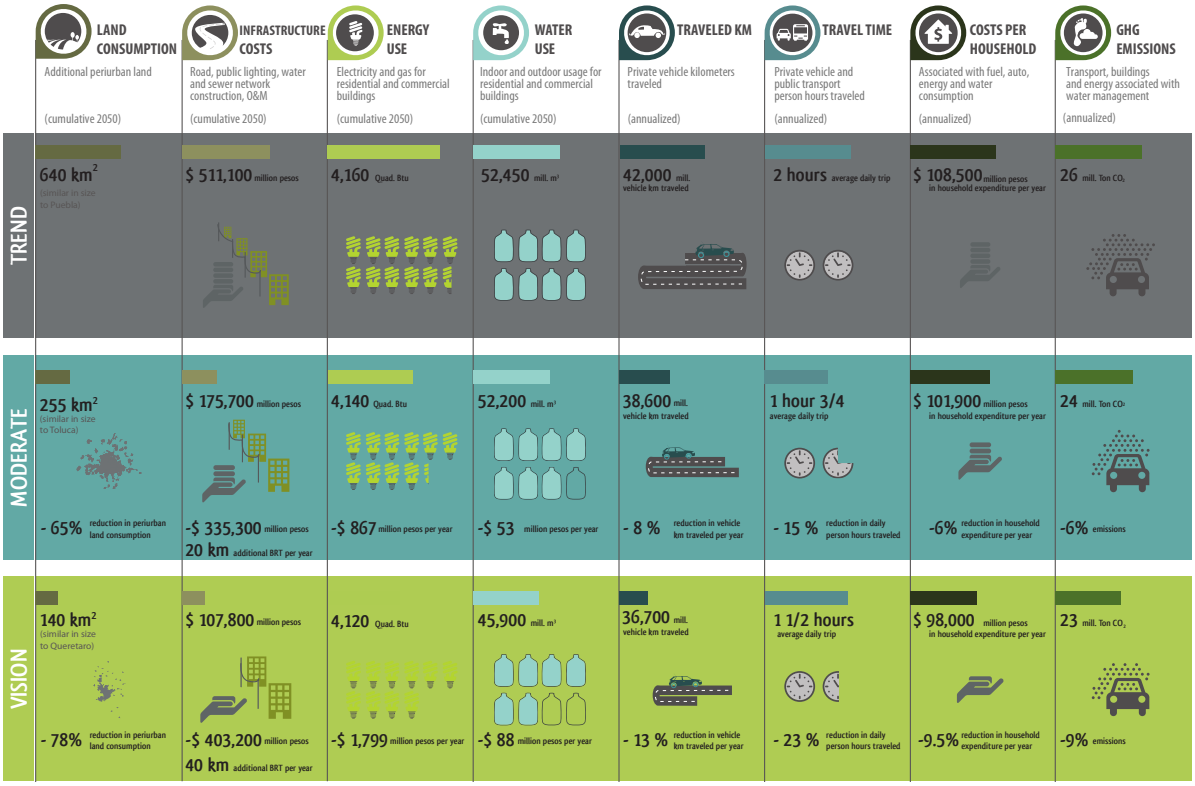
As the figure shows, outcomes across the scenarios vary substantially. The compact "vision" scenario reduces new land use by 80 percent, annual energy costs by $90 million, and annual water consumption by 11.8 million cubic feet by 2050. In addition, the vision scenario provides for a 13 percent reduction in the use of private automobiles in terms of distance driven and a 23 percent reduction in average commute time. Household costs for transportation and basic services are reduced by 10 percent, and GHG emissions are reduced by more than 9 percent per year.

These models provide a useful tool for strategic planning of the city and for promoting dialogue among national and local governments, the private sector, and civil society.

Source: This box draws on Centro Mario Molina and Calthorpe Analytics (2015).

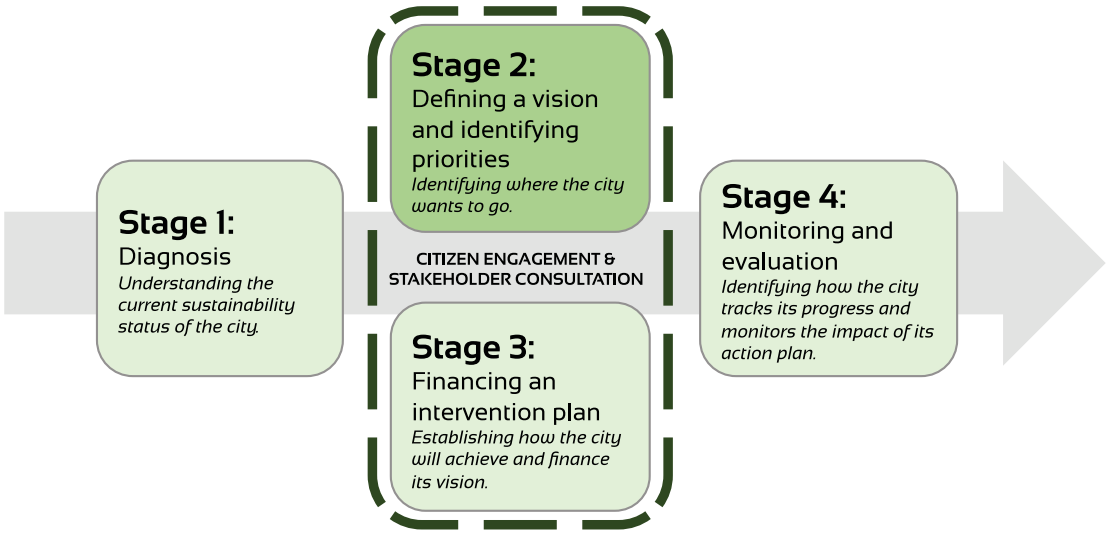
- RapidFire was developed by Calthorpe Analytics to frame long-term metropolitan growth.
- It is a spreadsheet-based tool that uses a broad range of projections, from demographic, to travel, to fuel and energy emission factors.
- Output metrics are calculated that demonstrate the relative effects of different land use scenarios and policy options. Inputs can be customized and estimate economic, environmental, and social consequences.

Figure 6. Scenario Results



Source: Centro Mario Molina and Calthorpe Analytics 2015. © Centro Mario Molina 2014. Reproduced with permission from Centro Mario Molina; further permission required for reuse.

Stage 2: Defining a Vision and Identifying Priorities



Once city decision makers understand how their city performs, they have completed the first step to effectively guide their city's future. The analytical capacities and tools identified in the previous section help produce the information a city needs for the second stage of the USF approach—defining a vision and identifying priorities. These indicators may also be useful for monitoring and evaluating progress over time.

Defining a vision and setting priorities for urban sustainability can help a city do the following:

- Build a shared vision of the desired future and foster a collective sense of purpose, an inclusive identity, and a unified agenda;
- Support decision making and empower people by providing a clear focus for effort, and drive appropriate, efficient, and effective use of resources;
- Avoid distraction or deviation from goals by defining what is, and is not, prioritized within the scope of the city's objectives; and
- Communicate what matters to the city to build understanding, support, and commitment across diverse stakeholder groups.

In setting out guidance to help cities define a vision and identify priorities, stage 2 is a crucial step in intervening in the city's business-as-usual trajectory. It enables the city to aspire to, and achieve, a different, improved future.

Stage 2.1. Developing a Vision

Sustainable cities have a clear vision of what they want to become and follow that vision with a plan. They develop interventions and strategies in a systematic and coherent manner. For many cities, "visioning" is a way of laying out a long-term future.

Cities may wish to refer to the six dimensions of urban sustainability included in part II to help focus their vision.

Vision statements are concise records of the city's aspirations for its future. While vision statements are unique to each city, most statements share certain common characteristics.

As outlined in Ambler (2013), vision statements should be:

- **Future-focused,** to make clear the city's direction and provide a specific picture of what the city will look like in the future (e.g., 5, 10, or 20 years from now); and relevant to and grounded in the city's current reality and context;
- **Challenging and inspiring,** to uplift, engage, and invite people to commit to a cause that stretches to a high standard (setting a vision for what is beyond possible today but is aspired to for the future);
- **Directional and clear,** to enable effective guidance for decision making and independent action; specific enough to be actionable, but flexible enough to allow for a variety of successful implementation approaches;
- **Purpose-driven,** to provide a larger sense of purpose, as well as values-based and connected to the city's core values and ideals;
- **Understood and shared by members of the community,** and broad enough to include diverse local perspectives; and
- **Easy to communicate.**

For example:

- Through Vision 2030, the City of Stockholm has clarified its long-term ambition and aspiration to become a world-class city by 2030, one that is versatile and offers a range of experiences, that promotes innovation and growth, and that is safe, accessible, and inclusive for all citizens.
- Sustainable Sydney 2030 expresses the community's vision for and the city's commitment to a green, global, connected city:
  - **Green** implies a modest environmental impact, as well as trees, parks, gardens, and linked open spaces;
  - **Global** relates to economic orientation, knowledge exchange, and open-minded outlook and attitude; and
  - **Connected** means physically connected—through walking, cycling, and high-quality public transport—but also "virtually" connected by world-class telecommunications, socially connected by communities' sense of belonging and social well-being, and connected to other spheres of government and to those with an interest in the city.

- Malaysia's Urban-Rural National Indicators Network for Sustainable Development (MURNInets) is a program developed by the Federal Department of Town and Country Planning, Peninsular Malaysia, to assess Malaysian cities' performance and level of sustainability. Further information is found in annex C.
- By creating the Melaka State Structure Plan 2035, this state in Malaysia aims to develop a thriving, green, inclusive, and resilient state with a unique identity. It provides a planning framework that aims at driving and controlling physical development at state level, as articulated in Section 8 of the Malaysian Town and Country Planning Act 1976 (Act 172). It is structured along six dimensions:
  - Promoting economic growth;
  - Assisting sustainable development;
  - Physically reconstructing the living environment;
  - Improving relationships;
  - Managing traffic; and
  - Developing socioeconomic welfare.

Stage 2.2. Identifying Priorities

Building on the findings from stage 1's diagnosis and analyses, city decision makers can identify where to focus their efforts. The city's strengths and weaknesses, its current and projected future performance, and the vision for the city's future should all be considered.

More specifically, this analysis will help city decision makers identify what interventions to prioritize in order to and current-day performance for their long-term vision for the city.

The following are key questions for city government decision makers to consider when identifying priority areas for action:

- Which focus areas capture the city's current policy priorities, based on existing plans and programs?
- What are the city's main weaknesses and challenges, as identified by the stage 1 diagnosis analyses and stakeholder consultations? Does the city government want to prioritize all identified areas of weakness, or only some of them?
- What are the city's main strengths and/or opportunities identified by the stage 1 diagnosis analyses and stakeholder consultations? Does the city government want to build further on these strengths?
- What are the main relationships between key focus areas within the city, and how can the city use these relationships to best effect? Are there opportunities to promote positive co-benefits and/or minimize trade-offs?
- What city plans and processes are under way or planned in the near future that can be leveraged to accommodate, or benefit from, further interventions?
- What scale of ambition or degree of change does the city government strive for—incremental change, a more substantial shift, or transformational change—and over what time period?
- Do city government priorities align with local community and stakeholder priorities?
- Are priorities pragmatic and can they be feasibly implemented, monitored, and evaluated?

Once the city has completed this prioritization, it may wish to develop short-, medium-, and long-term goals and objectives specific to the priority focus areas.

Stage 2.3. Developing an Intervention Plan

Once a city has established a vision for its future and identified the priority focus areas that will drive efforts to achieve this vision, it can begin to develop a plan to make this vision a reality.

Each city has its own needs for an intervention plan, depending on factors such as the city's vision, priorities, capacities, and position along the spectrum of urban sustainability. Common characteristics of effective, successful intervention plans include the following:

- Clear commitment to the plan by the city's leadership;
- A clear vision with associated priorities, goals/objectives, and interventions to achieve this vision;
- Discrete targets that clearly link to the city's interventions and goals/objectives, with time horizons for reaching these targets;
- Clearly defined roles and responsibilities for implementing interventions;
- Adequate resources to complete interventions;
- Identification of actors in addition to city leaders, for example stakeholders or other partners.
- Identification of the plan's intended outcomes and impact;
- A methodology to measure and monitor the impact of interventions;
- Mechanisms to adapt or modify interventions as required to meet the city's targets; and

- A process to review and update the city's plan to ensure that it remains fit for purpose.

Cities should also consider their capacity to take action and whether collaborating with other actors to undertake interventions may be necessary or desirable. C40 Cities and Arup (2015), along with University College London, describe the following typologies of governance adopted by cities, recognizing that cities may employ more than one model of governance depending on their levels of power across different city assets or functions:

- **Commanding cities** typically use regulation and enforcement to deliver action. The role of private and other actors is often small;
- **Implementing cities** commonly take action through the delivery of projects and programs, often without the input of private sector and other actors;
- **Providing cities** are characterized by a high level of control over service delivery, and are able to take action through this influence;
- **Legislating cities** achieve progress on interventions by setting policy and legislation that requires others to act;
- **Collaborating cities** usually act in partnership with other actors to leverage their respective powers; and
- **Facilitating cities** have limited power to take action directly, and instead focus on creating an attractive environment for others to act.

When identifying and developing opportunities and interventions to pursue, cities should consider how closely the effort aligns with the priority areas and the degree to which the effort will move the city toward their goals and vision (e.g., what are the outcomes that this intervention will deliver?). Cities must also consider the feasibility of implementing a change, in terms of political will, technical feasibility, cost, time line, scale, etc.

Opportunities and interventions may comprise changes to a physical (or hard) asset, such as a new development, technological solution, or other built structure. They can also comprise a soft intervention, such as a process or policy that builds knowledge or empowers skills and leadership (e.g., training, capacity building, behavior change, improved coordination between departments).

To identify who has direct control or influence over an intervention, it is helpful to ask the following questions (C40 Cities and Arup 2015):

- Who owns or manages the opportunity and/or intervention?
- Who sets policies and enforces regulation relevant to the opportunity and/or intervention?
- Who controls budgets and/or financing available for the opportunity and/or intervention?
- Who sets the vision for the opportunity and/or intervention?

Opportunities and interventions should promote a holistic, interconnected approach to city functions and consider the city as a system of systems, and they should aim to bridge silos through an inclusive process that acknowledges codependencies and interdependencies. This integrated approach can help new ideas emerge and bring together new opportunities for cross-sectoral innovation. It can maximize synergies, foster efficient use of resources, and build longevity by ensuring that stakeholders and co-owners are engaged and invested the effort. An example of this approach, New York City's OneNYC plan, is given in box 8; more provided in annex D.

Box 8. OneNYC Plan

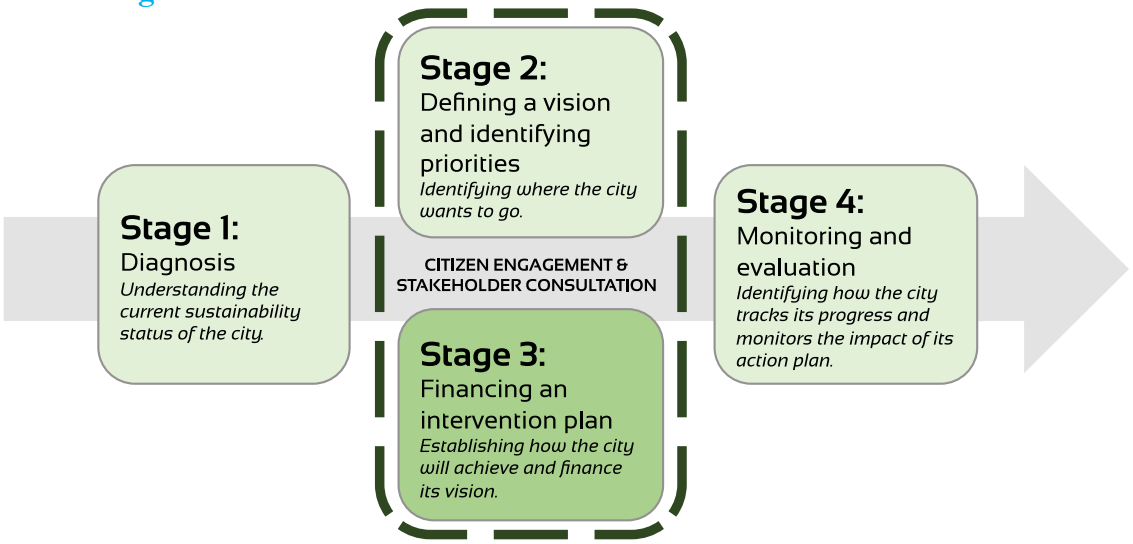
New York's OneNYC plan was developed with cross-sectoral interagency collaboration, public engagement, and consultation with renowned experts in their respective fields. OneNYC's initiatives are ambitious but realistic and will prepare New York City for the challenges it faces today and in the years to come. The plan includes four visions:

- **Vision 1. A growing, thriving city.** Continue to be the most dynamic urban economy in the world, where families, businesses, and neighborhoods thrive.
- **Vision 2. A fair and equitable city.** Develop an inclusive and equitable economy that provides well-paying jobs and opportunities for all New Yorkers to live in dignity and security.
- **Vision 3. A sustainable city.** Be the most sustainable city in the world and a world leader in the fight against climate change.
- **Vision 4. A resilient city.** Ensure neighborhoods, the economy, and public services are prepared to withstand and emerge stronger from the impacts of climate change and other threats of the 21st century.

Importantly, these visions are divided into a total of 27 goals and targets and a series of key indicators that will be reported on an annual basis. In total, there are approximately 55 quantitative indicators designed to help the city monitor and evaluate the effectiveness of its programs, policies, and initiatives. In addition, specific initiatives are defined for each corresponding target, with clear information on funding status and sources.

Source: City of New York 2017.

Stage 3: Financing the Plan



Stages 2 & 3 are carried out in parallel to ensure correlation between the project visioning and the financing.

Having identified priorities for investments, city leaders then confront the problem of financing those investments. How do city leaders bridge the gap between readily available resources and investment needs? What sources should they tap? A city's sustainability vision and intervention plan will not materialize unless financing supports them. A best-practice principle is to develop a city's intervention plan as a business plan that can be implemented on the ground. Thus the USF places stage 3 (financing) parallel to stage 2 (defining a vision and identifying priorities). This arrangement highlights the need to secure sufficient financial resources to successfully implement the vision and the intervention plan. Cities may have to revise priorities when taking into account financial constraints, and may have to select actions with the highest return on investments that broadly enhance sustainability dimensions.

In general, financing sustainability interventions faces three interrelated challenges: (1) cities do not have the capital they need to invest in projects; (2) there are insufficient recurrent revenues for city governments and urban service providers; and (3) cities and urban service providers lack access to market-based financing for urban infrastructure.

To address these challenges, city governments and their urban service providers need to take actions that promote their long-term financial sustainability. This section provides an overview of the options and processes for financing a city's action plan. The goal is to help cities

- Understand and assess their current fiscal sustainability status so that they can build on areas of strength and address areas of weakness; and
- Better structure urban infrastructure financing so that funds for the infrastructure needed to improve sustainability are accessible.

To finance investments in infrastructure, city leaders have three main tasks:

1. **Value and develop the city's fiscal sustainability.** Fiscal sustainability can be achieved by securing cash flows through user fees and taxes—and, where necessary, by raising revenue by leveraging assets. It is also possible to tap capital markets, either by issuing bonds or by borrowing from specialized financial institutions and intermediaries. Experience shows that cities can increase their fiscal sustainability and that subnational debt financing can work, assuming that clear regulations are in place to (1) guide the issuance of debt; (2) manage risks from borrowing; and (3) clearly set forth the conditions under which subnational governments can issue debt (including the purpose, type, and amount of debt that can be issued). Smaller cities may need to pool their credit requirements or enhance their credit quality to attract lenders. Thus, governments of smaller cities can use bond banks, loan pools, and guarantees to reduce lenders' risks.

2. **Coordinate public and private finance using clear and consistent rules.** There are at least two situations in which private financing may be a city's preferred course: when the government sees public-private partnerships (PPPs) as a way to improve efficiency in service provision, and when a service can be provided on a profit-making basis by a private entity. With enough assurance that commitments are firm, PPPs can shift the fiscal burden of infrastructure improvement projects off the public budget (though it is important to account for any contingent liabilities that local government may face as a result). Nevertheless, PPPs are no magic bullet: they

require commitments to sustainable cost-covering tariffs or equivalent tax revenues. They cannot stand in for good financial management or good project evaluation. To successfully implement PPPs, the GPSC encourages cities to use the enabling dimensions of the USF to assess their public sector capacity, their legal framework, the level of integration of their planning, the prioritization of their investments, and their degree of risk. Cities are encouraged to ensure transparent and competitive procurement, build strong monitoring systems, and allow flexibility for adapting to unpredictable events.

3. **Leverage existing assets to develop new ones, linking both to land use planning.** Leveraging assets can involve land and property taxes, land sales and leases, charges for impact and for development (developer extractions), betterment levies (land value capture taxes), and tax increment financing. Of special interest is land value capture that monetizes increases in land value resulting from infrastructure improvements. Land value capture can be based on integrated planning of transit provision and land use, which is part of an enabling dimension—governance and integrated urban planning—of the USF. This enabling dimension is essential for making land value capture instruments work. The applicable government institutions should clearly define property rights, objectively value land using standard methods, and support and oversee land management, land sales, and tax collection.

Stage 3.1. Assessing Financial Sustainability: Valuing Creditworthiness

It is beneficial for cities to be able to assess their own financial capability and demonstrate their degree of creditworthiness. Creditworthiness refers to the capacity of a city government to meet its financial obligations, including repayment of its debts. This is also the basic definition of fiscal sustainability. Creditworthiness is an aspirational goal, like other kinds of sustainability goals. What is important is for a city government to strive to improve its financial performance, so that it can ultimately demonstrate its creditworthiness (see box 9 for some examples of cities' effort to improve creditworthiness). Useful tools for measuring fiscal sustainability, including national scale credit ratings (or shadow credit ratings), are described in detail in annex E.

Continuing improvement of financial performance helps the city government gain access to subnational credit markets and so finance its sustainability intervention plan. Too often, even where subnational credit markets exist, it is hard to find useful and reliable information on the finances of city governments in developing countries—one reason being a lack of transparency in municipal government operations. Cities in developed countries make information on their finances available in the form of public financial statements and credit ratings. Credit ratings are a standardized measure of creditworthiness, and come in various forms: public or private/shadow; national or international scale; institutional or transactional. Once a city receives a credit rating, it is better positioned to access subnational credit markets to finance its intervention plans.

Box 9. Valuing Creditworthiness in Cities in Columbia, India, Peru, and Kenya

Colombia. Colombia has promoted fiscal transparency by publishing traffic-light-style ratings of local payment capacity, with red, green, and yellow signals reflecting a combination of liquidity and solvency indicators. In ratings of municipalities' subnational debt, a red light identifies a municipality whose ratio of interest to operational savings exceeds 40 percent and whose ratio of debt stock to current revenues exceeds 80 percent. Red-light municipalities cannot borrow. Green-light municipalities can. Yellow-light municipalities can borrow only after obtaining the approval of the central government.

India. In 1995, the Ahmedabad Municipal Corporation took the groundbreaking step of requesting a credit rating from one of India's leading credit rating agencies for a domestic municipal bond. Ahmedabad's first credit rating was A+, indicating adequate security for investors. After re-examining the financial structure of its project with attention to credit enhancement, Ahmedabad returned to the rating agency the following year and received a rating of AA, indicating a higher degree of security for its structured bond. When Ahmedabad issued 1 billion Indian rupees ($25 million) worth of domestic bonds without a state or national government guarantee in January of 1998, the public portion of the issue was oversubscribed by more than 15 percent.

Peru. In 2010, the Municipality of Lima obtained a loan to finance urban infrastructure. In an initial step, with the aid of donor-supported technical assistance, the city had applied for a credit rating from an international rating agency. The credit rating helped to facilitate a $70 million commercial bank loan from BBVA Banco Continental to the municipality. This loan took Lima a considerable way toward securing long-term financing—its maturity was double that of the city's previous debts, making debt service payments more affordable and freeing municipal revenues to cover critical operating expenses. The loan was partially backed by a $32 million guarantee from the International Finance Corporation that enhanced the city's credit quality.

Kenya. In Kenya, the Water and Sanitation Program, together with the Water Services Regulatory Board, recently completed an effort to establish utility shadow credit ratings for 43 urban water supply providers. In the process, they found that 13 would likely be rated A or BBB creditworthy and 16 would likely be rated BB; these high credit ratings may open the door to private commercial finance on the local bond market for these local water suppliers.

Source: Adapted from World Bank 2013.

Stage 3.2. Prioritizing Investment and Structuring Financing

Identifying and Prioritizing Investment: Capital Investment Plans

City governments must fulfill essential prerequisites in order to access the market-based long-term financing needed to implement their sustainability intervention plans. To access long-term financing for urban infrastructure, a city needs (1) a capital investment plan (CIP); and (2) a plan for structuring the financing for infrastructure projects in the CIP.

A city's CIP translates the 10-year to 30-year investment priorities of the sustainability intervention plan into a defined set of well-prepared projects that, if implemented, will help the city achieve its sustainability targets and goals.[11] A city can use its CIP to:

- Implement sustainability intervention plans;
- Extend the service life of infrastructure assets; and
- Maintain creditworthiness.

The CIP is the basis for the annual capital budget, which is developed using project-level data on capital investment costs as well as operating revenue and expenditures over a 10-year to 15-year time horizon. Formal approval of the CIP by the city government makes the city's investment plans transparent to the financial community.

A CIP preparation process can be specifically designed to select projects that meet the investment priorities of the sustainability intervention plan. Information on climate-smart CIPs can be found in box 10.

A city is faced every budget cycle with competing, and sometimes even conflicting, proposals for allocating scarce financial resources. The GHG emissions from just one power plant can set back a city's plan to meet carbon reduction targets for decades. A city only achieves resilience when all capital investments prove

Box 10. Importance of Climate-Smart Capital Investment Planning

Cities face a gap between infrastructure needs and available finance (World Bank 2010; World Economic Forum 2014). The creation of well-designed CIPs can increase creditworthiness, and thereby expand the capacity of cities to fill the infrastructure investment gap (Marlowe, Rivenbark, and Vogt 2009). Capital investments are climate-smart and resilient when they serve the social, economic, and environmental purposes for which they were intended, while also reducing GHG emissions, helping communities adapt to climate change, and promoting resilience to any number of disturbances a city could face.

Climate-smart capital investment planning can have direct fiscal benefits through the selection of cost-effective projects more likely to withstand hazards. Just as meaningful, however, are the indirect benefits of this major step toward creditworthiness, such as using fiscally prudent techniques for selecting investments, and creating a pipeline of low-carbon, resilient projects for financing.

Source: Adapted from Whittington 2016. Original text © Jan Whittington 2016. Adapted and reproduced with permission from Jan Whittington; further permission required for reuse.

[11] The discussion here is adapted from Whittington (2016).

robust to the catastrophic threats it faces. A climate-smart CIP guides cities away from the problematic pattern of choosing projects that are less expensive in the short-term but pose hazards to life and livelihoods or entail unnecessarily high operating costs in the long term. Sustainable cities break out of this pattern with urban plans that help them invest in cleaner, more affordable, and more safely located public facilities (e.g., water systems, transport systems, and hospitals). By designing facilities to be climate-smart and resilient, cities can achieve these fundamental goals while improving the local economy, the long-term value of their assets, and the health and well-being of their citizens.

Adopting a sustainability-focused process for capital investment planning integrates the goals for growth and resilience that are identified in urban or regional spatial plans with decisions made each year about which capital investments to make. A city with citywide or regional plans that identify areas of human settlement at risk from hazards as well as areas that are rich in environmental assets—that is, areas that perform valuable ecosystem services, provide sources of revenue from tourism, or are targeted for preservation for their unique qualities—can use the climate-smart CIP to select the investments that reduce the vulnerability of both human and environmental assets. For them, the process can provide assurance that investment decisions made on a regular basis are in alignment with their comprehensive plans.

To use its CIP to reduce GHG emissions and select resilient investments, a city should perform analyses on a project-by-project basis in a sustainability-focused process of decision making. This approach can have direct fiscal benefits through the selection of projects that are more cost-effective to operate and maintain and more likely to withstand hazards.

To attract the financing needed to implement its sustainability intervention plan, a city must move beyond a general wish list of investment priorities. Each investment must be carefully defined and prepared. There are two types of investments that a city can make to improve sustainability: capacity-building investments (soft infrastructure), and investments in physical assets (hard infrastructure) (IDB 2014, 105).

Capacity-building investments enable a city government and its urban service providers to improve their management. The investments may entail improvement of urban planning, disaster response, and/or financial management with a focus on increasing sustainable performance of these functions.
Investments in physical assets reduce any foreseeable risks to the city's sustainability. Such investments may include hard infrastructure for upgrading informal low-income neighborhoods, improving transportation, delivering water and sanitation services, expanding energy distribution, or making solid waste collection and disposal more environmentally sound. Hard infrastructure investments need to be carefully structured financially, institutionally, and legally in order to mobilize the necessary long-term capital financing needed for project implementation.

Both types of investments are likely to be among a city's investment priorities and require capital resources. But before they are implemented, cities must carry out pre-investment studies. These are an indispensable requirement for accessing long-term financing; their evaluation of the project's characteristics—technical, financial, fiscal, legal, institutional, operational, environmental, and social—helps determine whether executing the project is feasible. Such studies also help reduce the risks of the project and foresee obstacles that could occur during the implementation. Specifically, for the provision of public services, such exercises help to determine the methods and means of cost recovery (charges and subsidies).[12]

[12] There is now a growing effort to assess the sustainability of physical infrastructure using rating systems. This could be an important part of a pre-investment analysis that supports development of a climate-smart CIP (IDB 2014, 105).

Funding for hard infrastructure pre-investment studies and project structuring advisory services is most likely to come from public sources such as higher levels of government, local development institutions, and/or external donors. However, the long-term financing for infrastructure must come from public, private, and mixed (PPP) resources through a variety of mechanisms; public resources alone are too scarce and are needed to leverage market-based capital in order to achieve the scale of investment that cities require (IDB 2014, table 7.1).

Structuring and Accessing Financing

A city's plan for financing identifies the expected sources of financing for each of the projects in its CIP. In many cases, the plan for financing is an integral part of a city's CIP, but if not, it is important to formally identify the expected sources of long-term financing for approved investments planned for the next three to five years in the CIP and in the current annual capital budget. The variety of long-term financing options available to a city will vary, but (leaving aside capital grants from higher levels of government or other donors) the most common sources generally include long-term debt (bonds or loans), PPP mechanisms, and land value capture mechanisms. These financing options are discussed in detail as part of stage 3.3.

Regardless of the financing mechanism chosen, the financial community's perception of the city's risk of default will probably need to be reduced in order to induce market-based financing of urban infrastructure. Credit enhancements are tools designed to reduce the financial default risk associated with a specific infrastructure financing operation such as a bond, loan, or PPP. The application of credit enhancements to a bond, loan, or PPP is an essential part of the structuring of the financing agreement. The reason for incorporating credit enhancements into a financing transaction is to give the financial community greater confidence that it will be fully repaid on an agreed schedule. In turn, the financial community's greater confidence should result in a lower interest rate, a longer repayment term, or both (assuming financial markets are competitive). In countries where the financial community lacks experience in financing urban infrastructure, credit enhancements have proven to be essential to mobilizing market-based financing. For example, credit enhancements were key to the successful financing of water infrastructure for 13 small cities in India (box 11).

Box 11. Structuring and Credit Enhancements: The Tamil Nadu Water and Sanitation Pooled Fund in India

In 1996, the Tamil Nadu Urban Development Fund (TNUDF) was set up as a public-private partnership, with the aim of providing sustainable financing for infrastructure investment. The government of Tamil Nadu owns 72 percent of the capital, and 28 percent is held by three Indian private financial institutions that have a majority stake in the asset management company that manages the fund, the Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL). This arrangement gave credibility to the fund and enabled it to attract private capital flows to development projects. By 2004, the majority of the portfolio consisted of sewerage and water supply projects.

The TNUDF approach tended to be used for municipalities with large and predictable revenue streams. However, a majority of the urban local bodies (ULBs) in Tamil Nadu with large neglected infrastructure needs are small and medium-size municipalities. Bond issuance fees and credit rating charges involved in accessing capital markets often generate transaction costs that are too high for

the smaller ULBs. In order to ensure the inclusion of weaker ULBs and relatively small but essential projects, in 2002 the government of Tamil Nadu and TNUDF instituted a special purpose vehicle called the Water and Sanitation Pooled Fund (WSPF). This fully owned government trust was set up to finance essential services like water and sanitation for small and medium-size towns by raising resources on a pooled basis through a market-driven approach. TNUIFSL was also entrusted with managing this fund.

Pooling the water and sanitation requirements of 13 municipalities and towns, WSPF mobilized capital market finance through an unsecured structured debt obligation for 304.1 million Indian rupees ($6.2 million) in December 2002. The bond had an annual coupon payment of 9.2 percent and a tenor of 15 years, with a put and call option at the end of a 10-year period. Several key structural elements helped reduce financing costs:

- Pooling a number of projects reduced the transaction and rating costs for the bond issue and made it more attractive to investors;
- The bond's repayment was supported by a portfolio of loans on-lent to the municipalities;
- The bond was issued in Indian rupees, preventing foreign currency risk; and
- The credit rating of the project pool was improved by structuring the debt to provide a series of credit enhancements, which allowed the creation of an investment-grade product (AA rating from two agencies) and reduced significantly the debt's coupon.

To strengthen the market's confidence in the bond, three different levels of credit enhancements were used:

- The first level was a no-lien escrow account set up by the 13 ULBs on all their revenues, including property and other tax collections, nontax receipts, and state devolutions. In order to avoid maturity mismatches in revenue and repayment profiles, each ULB had to transfer a tenth of its annual debt service to a separate fixed deposit account, with precedence over other commitments. The cumulative deposits were then transferred to the WSPF account to service bondholders.
- A debt service reserve fund, named the Bond Service Reserve Fund, was set up by the government of Tamil Nadu with liquid investments of 69 million rupees ($1.42 million), equal to one full year of debt service. The reserve fund is sufficient to ensure that the fund can continue to pay its creditors (that is, the purchasers of its bonds or its lenders) even when one or more of the fund's municipal borrowers fail to make repayments to the fund for interest on, or principal of, their loans. This additional security for the fund's investors makes it possible for the fund to issue its bonds on capital markets, or to borrow from institutional lenders, at rates and on terms that in turn allow it to make loans to municipal borrowers at attractive interest rates and other terms.
- A partial credit guarantee was issued by the U.S. Agency for International Development (USAID) for 50 percent of the principal amount; the balance was covered by the government of Tamil Nadu in the form of a government order stipulating that it would replenish the shortfall to the Bond Service Reserve Fund, deducting its respective share of State Finance Commission funds accruing to the municipalities involved.

Source: OECD 2010.

Most credit enhancements carry some cost. It is important for the city to weigh the financial gains produced by a credit enhancement against the cost of using the enhancement.[13] More than one credit enhancement can be used if cost-effective, and enhancements can be layered one onto another in ways that increase the financial community's confidence that it will be paid according to agreement.
Finally, financial structuring has to adopt the modality best suited to the financial characteristics of the project and the financing mechanism, and should use applicable tools to mitigate possible risks, such as political risk or risks created by the legal framework, fiscal context, macroeconomic variables, and institutional capacity. In the end, the financial structure must be adapted to the project's needs and to the local conditions facing the city seeking financing.[14]

Stage 3.3. Instruments for Structuring Urban Infrastructure Projects

Financial structuring is one of the critical elements that allow a city and urban service providers to access funds for the infrastructure needed to improve sustainability (IDB 2014). In many countries, it is currently not enough for cities to demonstrate that they are objectively creditworthy. The financial community's perceptions of risk may diverge from that of a credit rating agency for a variety of legitimate or mistaken reasons. It is therefore necessary to structure urban infrastructure financing in a way that reduces default risk and enables access to long-term financing at a cost that is feasible for the city or urban service provider.

Structuring appropriate institutional arrangements for building, operating, and maintaining urban infrastructure is an important first step. The institutional arrangements will largely determine the type of financing best used to develop infrastructure projects.

A wide range of institutional structures (from totally public ownership and operation, to private management contracts, to concessions, to totally private ownership and provision) has been identified by the Inter-American Development Bank (IDB 2014, table 7.2).

Deciding on the appropriate structure is an important policy decision to be taken by a city government. Before deciding on a structure for the project, it is important to get detailed analyses and recommendations from a qualified independent public finance advisory firm that has experience enabling public clients to mobilize long-term local currency financing for infrastructure.

Once an urban infrastructure project's institutional structure is decided, the next step is to access the needed financing. This entails using an appropriate combination of the three broad types of financing that have proven successful for developing urban infrastructure:

1. Long-term local currency public debt financing;
2. PPP in local currency; and
3. Land value capture financing linked to one of the other two.

Long-Term Debt Financing

In many respects, long-term debt financing is the least complex form of financing a city can use to develop urban infrastructure. Since cities do not normally have foreign/hard currency revenue flows, they should avoid taking any foreign exchange risk and always borrow in local currency (Painter and Gallo 2012).
If the institutional structure of the project calls for the capital investment to be a public responsibility, then the city government or public urban service provider will need to issue local currency bonds (or similar securities) to investors, or take long-term local currency loans from lenders.

[13] Cities that have had the best experience in mobilizing long-term market-based financing always retained an independent public finance advisory firm to research, analyze, and recommend a cost-effective combination of credit enhancements for the financing structure. The types of credit enhancements used in a structured financing also depend on the type of financing instrument: bond, loan, or PPP.
[14] See IDB (2014, 108), which explores the experience of Latin American and Caribbean cities in financing urban infrastructure.

In most countries, bond investors are institutions such as pension funds, insurance companies, and private investment funds that need to acquire long-term assets (e.g., bonds) to match their long-term liabilities (e.g., pension payments). Since most institutional investors also seek to avoid foreign exchange risk, a city should expect investors in their bonds to be domestic institutional investors. The investment risk-versus-return policies of these domestic institutional investors will determine how the bonds themselves should be financially structured to obtain the least-cost financing for the project. Recently, there has been growing interest among investors in using their capital to specifically support environmentally sustainable projects funded by "green bonds,"[15] (box 12).

Box 12. Green Bonds

A popular sustainability-focused financial instrument issued by commercial entities, a green bond is a debt security issued to raise capital specifically in support of climate-related or environmental projects. Those projects typically include renewable energies, energy efficiency, sustainable waste management, clean transportation, biodiversity, sustainable land use, or climate change mitigation and adaption. The green bond market has grown exponentially in recent years, from $4 billion in 2010 to over $37 billion in 2014, according to the World Bank.

The World Bank and its private sector lending arm, the International Finance Corporation (IFC), are active issuers in the market. As of June 2015, the World Bank had issued $8.5 billion through more than 100 green bond transactions in 18 currencies that have supported roughly 70 climate mitigation and adaptation projects in the developing world. The IFC, meanwhile, has issued more than 37 green bonds to date that have raised approximately $3.8 billion in nine currencies.

But private commercial lenders are also active in the green bond market. Bank of America has issued two green bonds—one for $500 million in November 2013 and another for $600 million in May 2015—to finance renewable energy projects in solar, wind, geothermal, and energy efficiency.

Green bonds are a convenient and conventional way for sustainability-focused investors to channel their resources into investments that aim to produce specific environmental impacts. To promote transparency for shareholders and investors around the investment process, a consortium of the world's largest investment banks developed a set of green bond principles in 2014. The principles were drafted with input from investors and environmental groups to boost disclosure and integrity in the development of the green bond market.

Source: Adapted from Mendoza 2015. Original article © Naki B. Mendoza 2015. Adapted and reproduced with permission from Naki B. Mendoza; further permission required for reuse.

[15] Here again it is important for a city to get detailed analysis and structuring recommendations from a qualified independent public finance advisory firm that has experience enabling public clients to mobilize long-term local currency financing for infrastructure.

Lenders for urban infrastructure include banks and nonbank financial intermediaries. However, most commercial banks tend to lend for shorter terms than institutional investors because their assets (loans) need to match their shorter-term liability structure (deposits). Nonbanks (such as urban development funds and bond banks) are often created precisely to offer longer loans for urban infrastructure. Lenders also prefer to avoid foreign exchange risk, meaning that cities will be seeking loans from domestic banks and nonbanks whose investment policies will determine the structure and terms of the loans.[16]

A specialized form of long-term debt financing known as "pooled financing" offers financing to a pool of cities with relatively small infrastructure projects. For a number of countries, pooled financing has proven especially successful in lowering the cost of financing for infrastructure projects that are not large enough to interest institutional investors or most commercial banks.[17]

Public-Private Partnerships

PPPs bring private sector expertise to the development and operation of an urban infrastructure project. While large PPP projects that bring private capital investment typically require complex legal agreements that cities must negotiate, monitor, and enforce, small-scale PPPs offer a number of benefits, especially where projects are developed by municipalities: they are close to those who need services most, respond to local demand and need, and offer opportunities for local investors and financiers that may not be available from larger projects.[18] Box 13 offers an example of a small-scale PPP project in Dehradun, India.[19]

Box 13. Small-Scale PPP Bus Terminal and Commercial Complex in Dehradun, India

Located 236 km from New Delhi, Dehradun is the capital of the north Indian state of Uttarakhand and is a popular tourist and educational hub. The private sector was asked to design, finance, build, operate, maintain, and transfer a bus terminal and commercial-entertainment complex, with a concession period of 20 years. Revenue to the concessionaire is from usage fees charged to the scheduled 750 buses per day, lease rental from the commercial-entertainment complex, and fees from other value-added services. The high-risk, low-revenue usage fees of the bus terminal were supplemented by significant commercial revenues. No expense was borne by the city to develop this relatively small facility as a PPP project.

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[16] A qualified independent public finance advisory firm can help cities get the best terms for their loans.
[17] In pooled financing, a nonbank financial intermediary selects a number of cities with relatively small infrastructure projects to participate in the pool. The financial intermediary (often called a bond bank or a municipal development fund) establishes carefully structured loan agreements with the participating cities that total to an amount large enough to interest domestic institutional investors. With assistance from a qualified public finance advisory firm, the public intermediary executes a bond issue that is backed by the underlying pool of loan agreements with the participating cities but is also structured with sufficient credit enhancements to attain a strong investment-grade bond rating that minimizes interest costs. The financial intermediary passes the capital raised from investors to the participating cities for their projects with only a small increment on the interest rate to cover operating costs.
[18] In fact, small-scale PPPs make up a significant share of total PPPs. The Private Participation in Infrastructure (PPI) Database shows that in 2013, approximately 40 percent of projects globally were valued at less than $50 million, and approximately 25 percent of projects were valued at less than $25 million, even though the PPI Database focuses on sectors more accustomed to larger projects (Delmon 2017).
[19] See GPSC (2017) for further information regarding small-scale PPP projects.

Land Value Capture

An alternative way to generate municipal revenue for investment project financing is through land value capture.[20] Land value capture refers to the partial or total monetizing of the land value increase generated by actions external to the land owner, such as public investments in infrastructure or administrative changes in rules and regulations on land use. Whether in the form of taxes (tax increment financing), fees (impact fees or contributions for improvements), or regulations (transferable development rights or land readjustment), land value capture mechanisms have a long history.

One of the main advantages of land value capture mechanisms is the virtuous development cycle that is generated through their use, in which value is created through public interventions (physical and/or regulatory), totally or partially monetized to capture the additional value, and reused to execute new local development projects. The potential of these instruments to generate resources is often overlooked,[21] but their use is increasingly gaining interest and acceptance. Apart from being a source of investment resources, these mechanisms can conveniently contribute to the construction of more socially and spatially equitable cities.

Land value capture mechanisms based on taxes and fees generate an increased own-source revenue flow that can be used to repay long-term debt financing provided by the financial community. Land value capture mechanisms based on regulatory betterment charges produce a series of one-time payments from property developers that may or may not eventually aggregate into enough capital to fully amortize the city's related infrastructure investment, and in any case the city will have to obtain financing for construction of infrastructure in the first place (debt or PPP). Finally, land value capture mechanisms based on public land acquisition or land readjustment may be useful for reducing public expenditure on certain types of infrastructure PPP projects, but they are unlikely to generate enough resources to recover the full capital cost of most projects. However, auction sales of public land can generate substantial capital for infrastructure.

Lessons from international experience show that strong governance is a prerequisite for successfully implementing land value capture instruments, as explained in box 14.

[20] This entire section is derived from IDB (2014), which explores the experience of cities in Latin America and the Caribbean.
[21] One of the main reasons why these instruments are not more widely used relates to the technical complexity of their implementation. A city may need expert assistance to understand and apply these mechanisms in practice.

Box 14. Leveraging Land to Finance Infrastructure: Four Lessons from International Experience

1. Strong institutions are needed to make land-based financing instruments work. Institutions are essential to clearly define property rights; to objectively value land using standard methods; and to support and oversee land management, land sales, and tax collection.

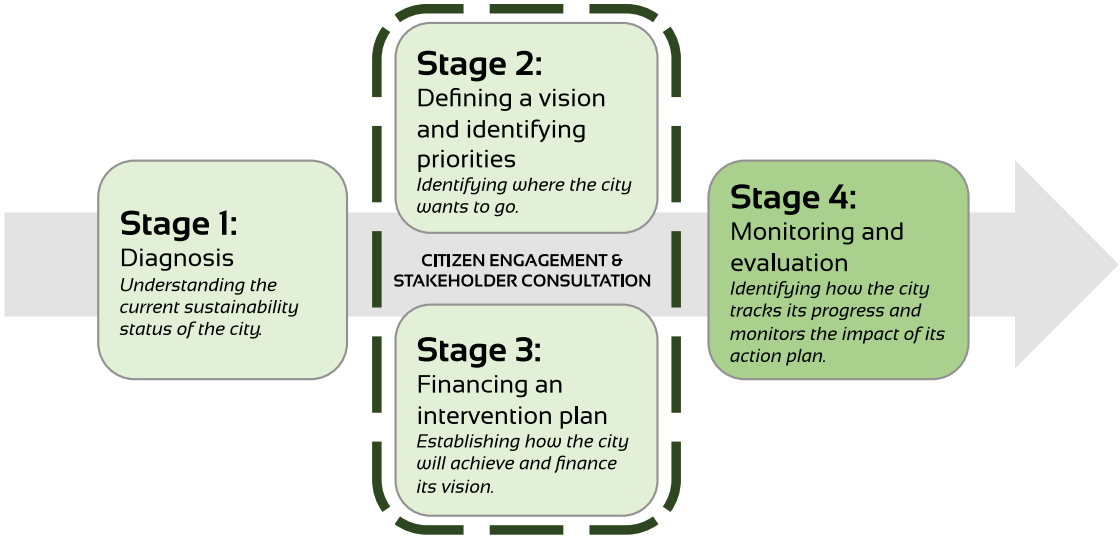
2. Land sales are most successful when coupled with other financing sources, such as a system of property taxes. Although useful as an initial source of revenue for infrastructure investments, land sales are not a reliable source of long-term financing; for that, a tax revenue system is needed.

3. Betterment levies and special assessment taxes bring revenue to municipalities based on the increase in land value from public improvements. In practice, the main challenge in using betterment levies is determining how to calculate the increases in property value due to improvements. Such determinations require institutions for valuation and for the collection and publication of price data. A simplified solution has worked well in Bogotá: levies are not estimated for each parcel but linked to a citywide fee. The success of this system is attributable partly to major efforts at updating and maintaining a comprehensive cadastral database—but also to growing citizen participation and oversight.

4. Development and impact fees, and tax increment financing, are seen mostly in developed countries—because their success requires strong institutions that many developing counties do not yet have. These instruments need a strong regulatory authority to enforce fee collection and to ensure that fees are used only for their defined purpose. Clearly defined property rights are essential. Other prerequisites for success include updated information on property values and a clearly defined methodology for estimating a project's impact on land and property values. For tax increment financing, a well-developed property tax regime is also required. Unless a strong property tax system is in place, imposing development and impact fees and establishing tax increment financing may be unrealistically ambitions.

Source: World Bank 2013.

Stage 4: Monitoring and Evaluation



After all the work to develop, finance, and implement a plan, how can city decision makers evaluate if their plan is working?

Setting targets for urban sustainability goals and using these targets to monitor and evaluate progress can help a city to answer these questions:

- Is our plan helping us reach our desired outcomes?
- Are we doing the right thing to achieve our desired outcomes?
- What impact do our actions/interventions have on helping us reach our goals, and is there something more or something else we could be doing?

Monitoring and evaluation can also help decision makers identify appropriate interventions to efficiently direct effort where performance may fall short, or redirect effort to areas of greater need if trajectories far exceed minimum targets.

Stage 4.1. Selecting Key Performance Indicators for Monitoring Progress

A key performance indicator is a quantifiable measure used to evaluate the progress of an organization (such as a city government, business, or other entity) in achieving a performance objective. Measuring against key performance indicators at regular intervals helps city governments understand the impact of their policies and plans and provides evidence on which to base future policy and investment decisions.

City governments can also use key performance indicators as a mechanism to communicate performance with stakeholders and demonstrate transparency in government. This communication of indicators may in turn help community members, investors, or other stakeholders make more informed decisions about plans, policies, and investment strategies the city has put forward for consideration, as well as inform decisions at the ballot box.

Cities can refer to the indicators they used during the initial diagnosis stage, and adopt and/or develop these for tracking performance, as follows:

- They can use the same indicators to enable a clear evaluation of "before" and "after" performances and to demonstrate performance change related to the city's efforts;
- They can select indicators that capture the city's strengths, weaknesses, opportunities, and challenges;
- They can address gaps identified in programs or policies; and
- They can focus on vulnerable groups, locations, assets, etc.

Cities should also identify how they intend to use the information that will be generated by monitoring and evaluation, and in particular consider the following:

- The type of indicators to include—qualitative (perception based), quantitative (numerically benchmarked), or a combination of both;
- The degree of control or influence the city government may be able to exert to impact the performance of the indicator;
- The ability to determine the relationship (correlation or causality) between actions and performance; and
- The needs of stakeholders, such as policy makers, vulnerable groups, insurers, funders, etc.

Cities can draw from the USF indicators included in part II to select those that are most relevant to their priorities and context. In this way, cities can create a bespoke set of key performance indicators to measure and monitor performance.

Stage 4.2. Implementing Monitoring and Evaluation

Monitoring and evaluation are vital to assess the effectiveness and impact of interventions and actions. They create an evidence base of the city's trajectory that can inform decision makers about the need to adapt their plan and/or interventions to reach their targets.

When developing a monitoring and evaluation program, cities should consider the following issues:

- Roles and responsibilities of actors;
- Challenges or issues around data collection;
- The frequency of data collection required to provide the information needed as well as the appropriate level of detail for the data;
- Alignment of monitoring and evaluation processes with other existing efforts to both employ resources efficiently and take advantage of existing, familiar processes;
- Lag time (i.e., the time between an intervention and the resultant impact) and sensitivity (i.e., the scale of impact required before an impact can be determined); and
- The frequency with which findings will be reported and whether reports will be publicly available.

Cross-Cutting Processes: Citizen Consultation and Stakeholder Engagement

Stakeholder engagement must be a formal and fundamental component of every stage in the process to enhance urban sustainability. Engaging with stakeholders increases the knowledge and expertise available for decision makers to draw on, potentially helping new ideas and innovations to surface. Empowering stakeholders to provide a meaningful contribution builds a shared sense of commitment and endorsement that can support decision makers as they undertake ambitious plans and interventions. Sharing data, indicators, and benchmarks with citizens is important to promote transparency, increase public awareness, and foster further community participation.

Consultation on a city's vision, urban policy, and action plan is critical to improve policy design and outcomes. It should be the foundation of urban design and management. Public engagement should be undertaken at the start of planning, urban design, and urban management initiatives to provide ideas and feedback pertaining to the environment and public interest. This collaborative process will help to instill a sense of civic pride and build social capital within communities. Research indicates a correlation between citizen engagement and environmental performance. For example, approximately three-quarters of the technological changes that would help London meet its long-term carbon reduction targets are based upon decisions by citizens or companies, not governments (Economist Intelligence Unit 2009).

Stakeholder engagement programs should include formal, scheduled efforts to discuss sustainability issues, along with efforts based on specific needs as they arise. These efforts are especially important when the city relies on stakeholders to undertake collective action beyond the direct control of the city government.

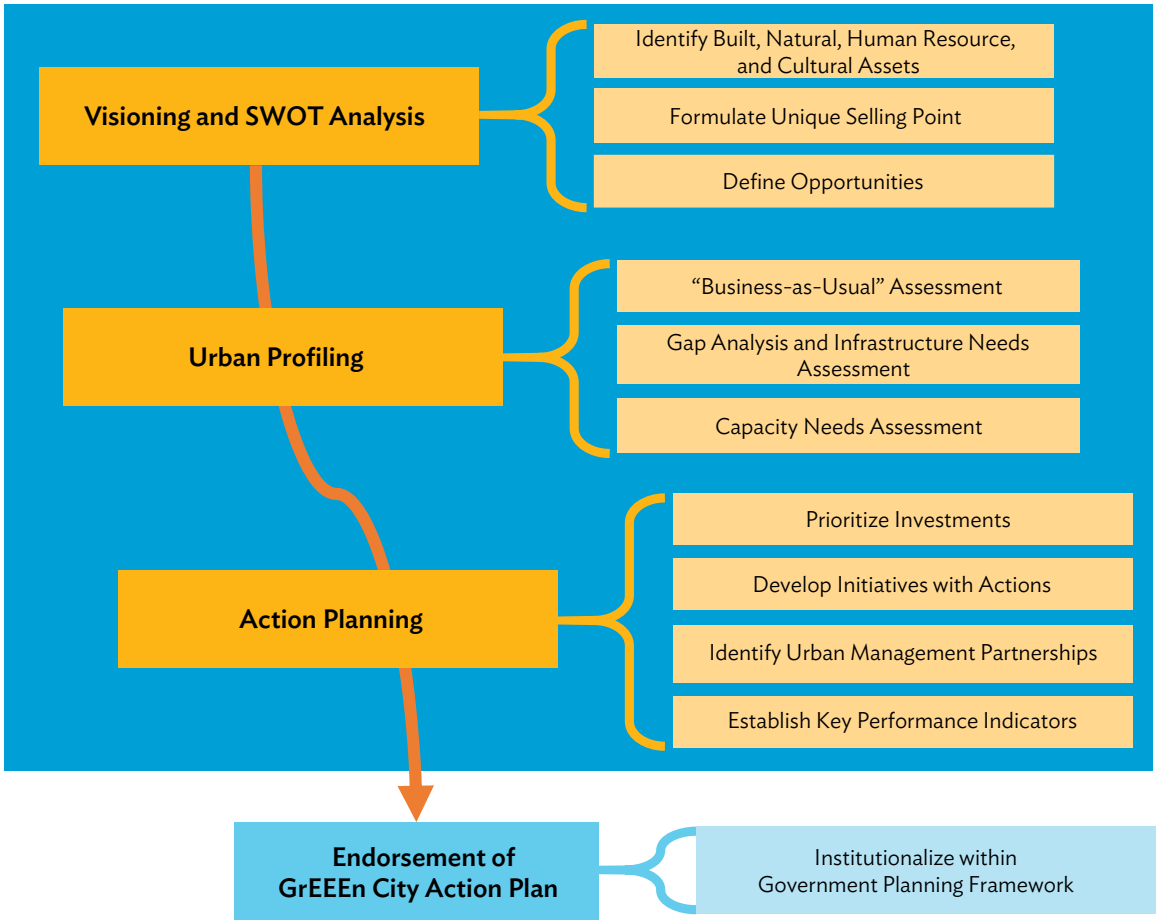
The form and content of stakeholder engagement efforts should also mirror the diversity of the city's population, as well as the complexity of sustainability topics. Participation should cover the full range of affected groups, with special attention given to representation of disadvantaged or marginalized groups.

Key stakeholders include representatives from civil society groups, governments (at city, state/regional, and national level), academia, industry, city advocacy and support networks, and other individuals and groups that are interested in or have knowledge that can contribute to sustainability efforts. An example of an inclusive stakeholder process is given in box 15.

Box 15. Asian Development Bank GrEEEn City Consultation Process

The Asian Development Bank (ADB) has developed a consultation process based on a visioning exercise that builds consensus on a shared GrEEEn City vision among various stakeholders. The preparation and implementation of the plan are led by a city government in coordination with key stakeholders. In this role, the city government faces two main challenges: (1) getting its staff out of their technical silos; and (2) ensuring the participation of private sector and civil society stakeholders. The plan formulation process is shown in figure 7.

Figure 7. GrEEEn City Action Plan Formulation Process



Source: Sandhu et al. 2016. © ADB. License: CC BY 3.0 IGO, https://creativecommons.org/licenses/by/3.0/igo/.

A people-first consultation approach and the participation of a diverse range of stakeholders, especially the disadvantaged, help to build inclusiveness. This approach ensures representation, ownership, and equity among all participants. Figure 8 shows results of stakeholder consultations in Hue, Vietnam, based on the ADB approach.

Figure 8. GrEEEn City Stakeholder Consultation in Hue, Vietnam

Source: ADB 2015. © ADB. License: CC BY 3.0 IGO, https://creativecommons.org/licenses/by/3.0/igo/.

a. The spelling of "GrEEEn" reflects the project's "3E lens" that focuses on environment, economy, and equity (Sandhu, et al. 2016). More details on the project are included in annex B.

3. Summary of USF's Assistance to Cities

The USF provides cities with tools to facilitate an evidence-based decision-making process that integrates multiple sustainability dimensions, thus enabling urban interventions in various sectors and different levels of government.

Although each action plan will differ in its policy priorities, the USF's four-stage approach is broadly applicable. The GPSC recommends that cities develop or enhance a sustainability plan through the four-stage process:

- **Stage 1: Diagnosis.** Conduct a systematic diagnosis process to inform the later USF stages.
- **Stage 2: Vision and Priorities for Action.** Define a vision with clear priorities and measurable targets to support the formulation of long-term goals that are both ambitious and achievable.
- **Stage 3: Financing the Plan.** In parallel to stage 2, develop and implement action plans that systematically improve financial management, encourage fiscal sustainability, and ultimately allow cities to maintain investment-grade creditworthiness.
- **Stage 4: Monitoring and Evaluation.** Systematically monitor and evaluate progress.
- **Cross-Cutting Processes.** Carry out stakeholder consultations throughout each stage to ensure transparency, and make public the results so that citizens can evaluate the actions undertaken.

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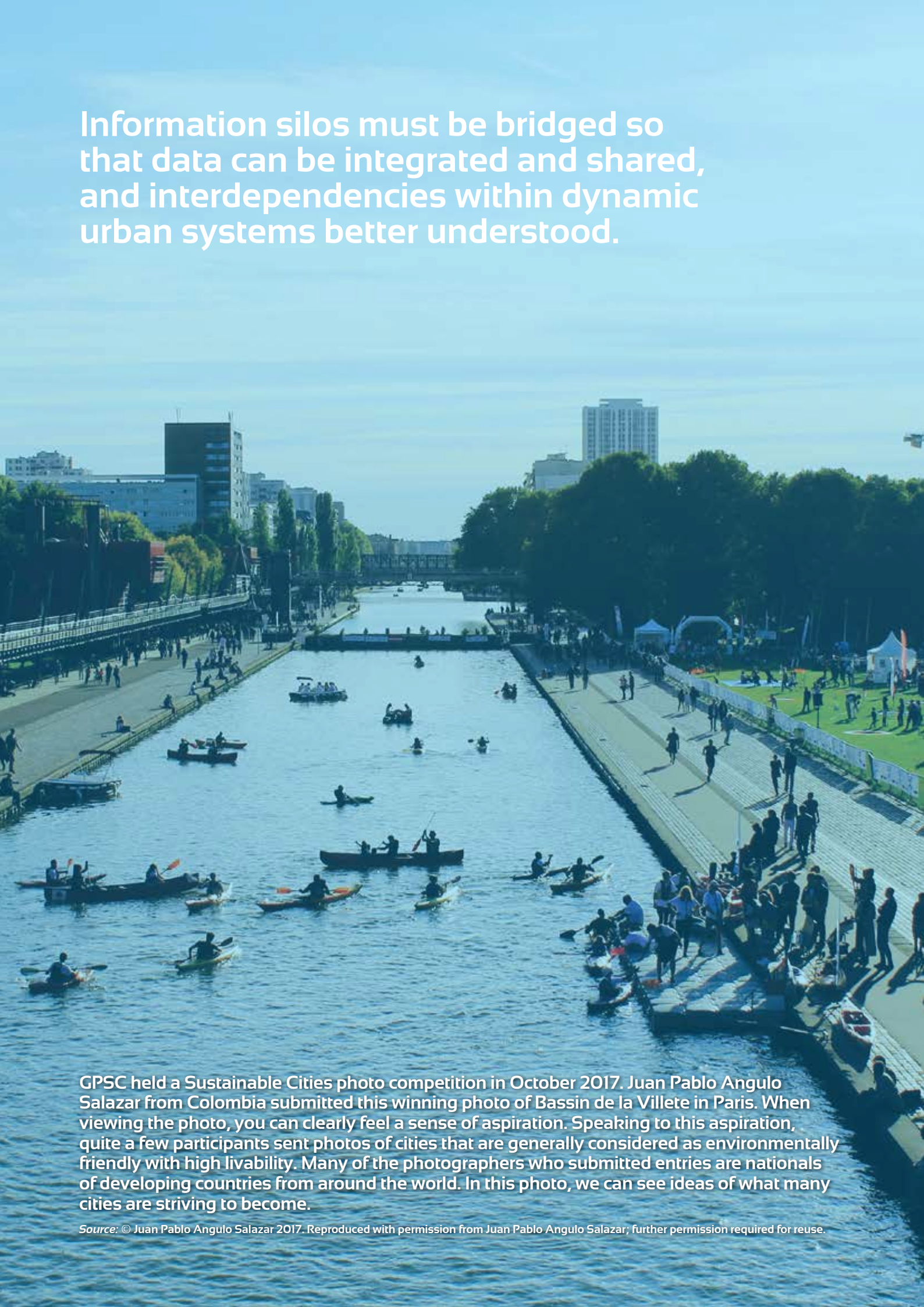
Information silos must be bridged so that data can be integrated and shared, and interdependencies within dynamic urban systems better understood.



GPSC held a Sustainable Cities photo competition in October 2017. Juan Pablo Angulo Salazar from Colombia submitted this winning photo of Bassin de la Villete in Paris. When viewing the photo, you can clearly feel a sense of aspiration. Speaking to this aspiration, quite a few participants sent photos of cities that are generally considered as environmentally friendly with high livability. Many of the photographers who submitted entries are nationals of developing countries from around the world. In this photo, we can see ideas of what many cities are striving to become.

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PART II: GPSC MEASURING FRAMEWORK

Purpose of the Measuring Framework

Planning a city requires an understanding of how different factors shape the ways people live, work, play, and influence sustainability. This understanding, in turn, requires relevant and accurate data on past, current, and projected city performance. With this knowledge, it is possible to better anticipate future demands and to craft policies and plans that enhance the overall sustainability of cities.

The rising complexity of urban challenges that span multiple domains means that one can no longer approach urban challenges by looking at urban systems individually, nor fully understand a problem by employing only the data of individual sectors. Information silos must be bridged so that data can be integrated and shared, and interdependencies within dynamic urban systems better understood.

Part II of the Urban Sustainability Framework (USF) presents a multidimensional framework designed to help cities understand and measure urban sustainability through the four-stage process explained in part I. Specifically, it will help cities do the following:

1. **Assess performance and track progress.** The framework can be used to track and monitor the progress of a city's performance. Cities should evaluate each indicator's current status, past trends, and future trends. A trend provides information on the evolution of the value for an indicator over the past 5 to 10 years, which is useful for understanding the dynamics of the city over time and the evolution of the city's performance. Future trends under different policy scenarios may be used to understand the impact of different policies on a city's performance and for making more informed development decisions.

2. **Benchmark regionally and globally.** Reporting against the indicators will help cities learn from one another by sharing best practices and allowing mutual comparison across a wide range of performance measures.

3. **Prioritize city actions.** As cities develop action plans, the framework can support prioritization of actions by considering various policy options and applying priority filters (environmental, economic, and social impacts, along with budget cost estimates).

4. **Vision, plan strategically, and monitor action plans.** The framework may be used to facilitate more robust target setting, with strategic objectives for each priority area, along with time-related targets and measures for cities' operations.

Image: Central Park by Victor, CC BY-NC-ND 2.0, www.flickr.com/photos/vic_206/23930568219.

5. **Improve transparency and citizen engagement.** Utilizing open data for various indicators can increase transparency and transform how citizens participate in governance. Local governments' publication of data on indicators can increase accountability and improve the quality of government services. To bring about these improvements, data programs must require disclosure, be promoted to increase visibility, have space for public reaction, and ensure data source accountability.

6. **Support open data and applications.** A growing number of cities, as well as international organizations such as UN-Habitat and the World Council on City Data (WCCD), are now making urban data freely available to the public. These initiatives are fairly recent, however, so the landscape of open urban data is not well known. A key benefit of having a large number of data sets openly and readily available is the ability to fuse data. However, this potential benefit depends on whether the data can be standardized so that data sets can be integrated with and compared to one another data. The USF set of core indicators offers cities an opportunity to synchronize various data formats so that data sets can be compared and integrated. This effort will support open data initiatives.

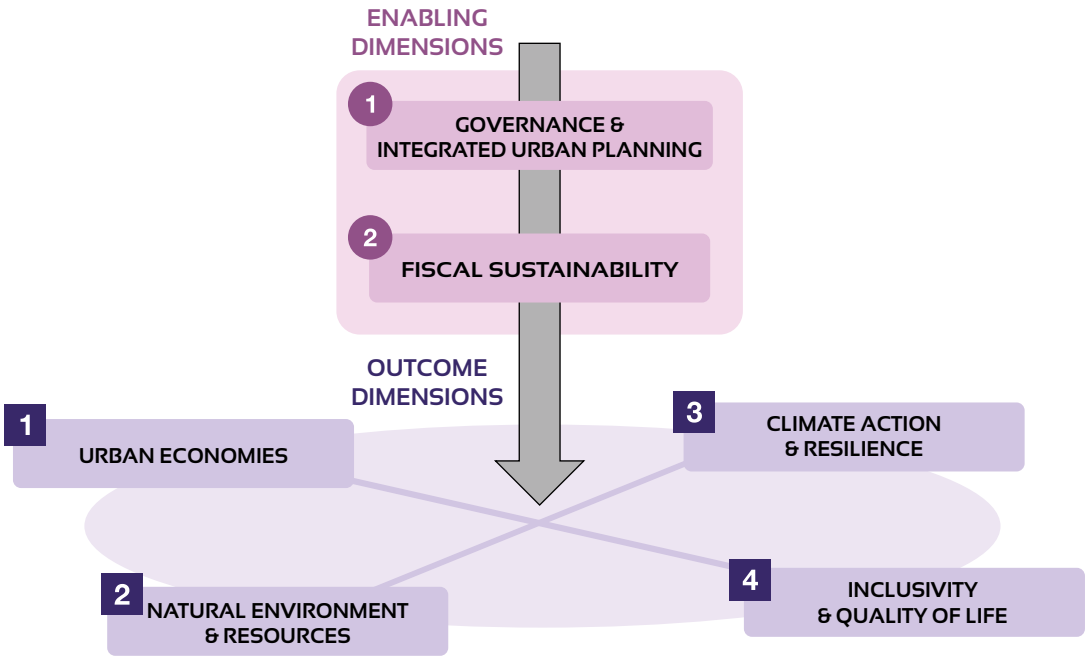
Overview of the Measuring Framework

The Measuring Framework comprises six interconnected dimensions that articulate:

1. The *enabling* environment that the GPSC program of activities aims to establish within cities in order to deliver outcomes (i.e., the **enabling dimensions**); and
2. The *outcomes* that cities can achieve by addressing urban sustainability (i.e., the **outcome dimensions**).

The relationships between the two enabling dimensions and four outcome dimensions are summarized in figure 9, which shows the enabling dimensions contributing to the outcome dimensions in order to create an integrated approach.

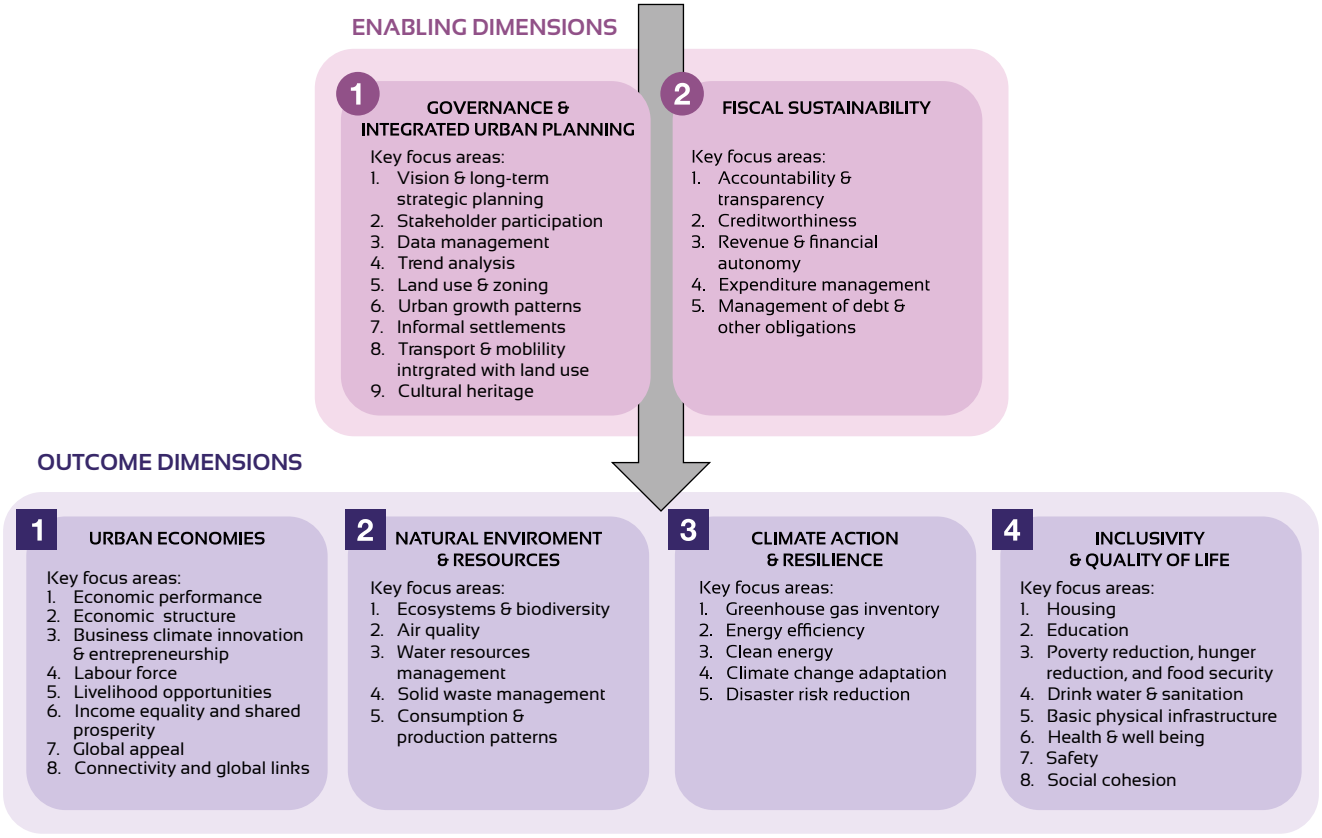
Figure 9. Relation between the Four Outcome Dimensions and Two Enabling Dimensions



Key Focus Areas

Underlying the dimensions is a series of key focus areas that articulate the city characteristics that particularly impact urban sustainability. These are important for cities to consider when diagnosing, measuring, and enhancing their sustainability performance within the Sustainable Development Goals (SDGs) and the New Urban Agenda. The key focus areas are summarized in figure 10.

Figure 10. Dimensions and Key Focus Areas of the Measuring Framework



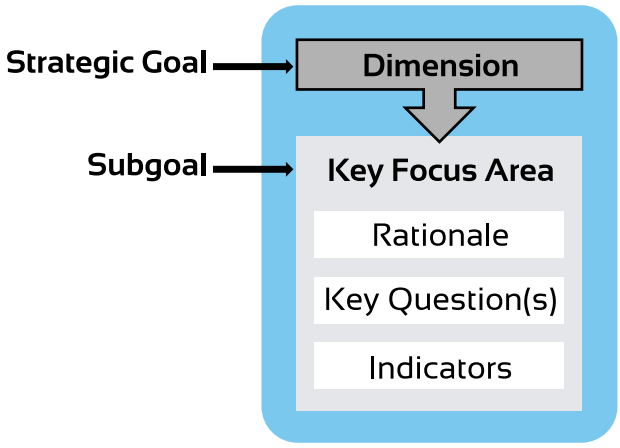
For organizational purposes, the Measuring Framework identifies separate dimensions for urban sustainability and aligns indicators with those specific dimensions and key focus areas. However, sustainability is a complex, multidimensional concept that cannot be effectively addressed without acknowledging the relationship between different city functions and systems. The six dimensions and goals are interrelated. Policies and actions that impact on one goal are likely to have additional impacts on other goals. For this reason, it is essential that cities adopt **an integrated approach to urban sustainability.** Such an approach should recognize the interrelationships between dimensions and maximize synergies between city systems and functions to reduce inadvertent negative impacts of one city system on another.

Cities may wish to use the key focus areas to help identify where to prioritize investment and action (see the discussion of stage 2 in part I). However, for every city, the relative importance of each focus area, and the way each focus area can be addressed, will be different. Each city will need to chart its own course toward the goals of the six dimensions by prioritizing focus areas according to its particular context and circumstances. In annex F read through a lens of the six dimensions about how Addis Ababa, Ethiopia, moved from diagnosis to creating priority actions for sustainable development.

Components of the Key Focus Areas

The selection of the dimensions and key focus areas is informed by different types of goals. Within each dimension are several key focus areas, which comprise rationale, key question(s), and indicators. The relationship between these different components is shown in figure 11.

Figure 11. Relationship between a Dimension and the Components of Each Key Focus Area



Strategic goals are indicated to help cities understand what their policies, plans, and decisions should ultimately be aiming to achieve within each dimension. Similarly, **subgoals** are indicated to assist the selection of key focus areas as well as specific key indicators.

The rationale of each key focus area lays out the reasons or logical basis for applying that set of questions and indicators to the assessment process. The rationale often includes typical implications for cities to consider.

Key questions set out in very broad terms what the diagnosis and measurement process should seek to answer for each focus area. The key questions are deliberately very high level in nature. It is expected that cities will augment the key questions with more detailed assessment questions specifically tailored to their unique context.

Finally, the **indicators** that have been identified within each of the focus areas provide a means for cities to begin to measure current performance in relation to the focus area. The list of indicators is not intended to be prescriptive or exhaustive. Cities may select the indicators that they consider most relevant and measurable, and they may add further indicators as appropriate. The GPSC encourages all cities to contribute toward international efforts to realize UN-Habitat's SDG 11, which focuses upon sustainable cities and communities. For this reason, the 14 indicators associated with SDG 11 are described as **core indicators** within the Measuring Framework. By using the 14 **core indicators** associated with SDG 11, GPSC cities can help establish comprehensive multi-city data sets for each SDG 11 indicator and in turn (1) help track international progress toward SDG 11, (2) allow peer cities to compare their performance, and (3) enhance knowledge sharing.

It is important to note that most indicators are cross-cutting and will directly or indirectly indicate performance across multiple focus areas. Selection criteria for the indicators are shown in table 1.

Table 1. Selection Criteria for GPSC Indicators

CRITERION	REQUIREMENTS
Policy relevance and utility for users	• Be simple, easy to interpret, and able to show trends over time; • Be responsive to changes in the environment and related human activities; • Provide a basis for international comparison; • Be either national in scope or applicable to regional issues of national significance; and • Have a threshold or relevance value against which to compare it, so that users can access the significance of the associated values.
Support for international sustainability efforts	• Be aligned with indicators to track progress toward the Sustainable Development Goals, particularly SDG 11 (sustainable cities and communities); and • Be aligned with themes and indicators identified with other relevant international commitments and communications.
Analytical soundness	• Be aligned with indicators to track progress toward the Sustainable Development Goals, particularly SDG 11 (sustainable cities and communities); and • Be aligned with themes and indicators identified with other relevant international commitments and communications.
Data measurability	• Be readily available or made available at a reasonable cost-benefit ratio; • Be adequately documented and of known quality; and • Be updated at regular intervals in accordance with reliable procedures.
Beneficial and people-centered in approach	• Should allow the city to assess the success of a policy in terms of the measurable benefits for the population, with special considerations for vulnerable, underrepresented, and/or less-advantaged groups.

Source: Adapted from OECD 2003.

Indicator References and Useful Sources

The USF utilizes existing indicators and proposes new indicators that generally cover cross-cutting issues between sustainability dimensions. Some of the indicators included within the USF are also used in several other initiatives that provide detailed methodologies for their calculations. Where applicable, users may refer to the available indicator sources for further definitions and calculation procedures. Some of these initiatives propose benchmarks organized by "low," "medium," and "high" terminology (European Bank for Reconstruction and Development [EBRD]) or by a "traffic light" (green/yellow/red) color coding system (see box 5 for information on the method of the Inter-American Development Bank [IDB]).

A specific mention should be made of **resilience indicators.** Resilience is an important component of urban sustainability that spans all of the USF dimensions.

Urban resilience describes the ability of cities, under the impact of shocks and stress, to continue to function so that the people who live and work there—especially the poor and the vulnerable—survive and prosper. The notion of resilience has helped to bridge the gap between traditional risk reduction policies and those of adaptation to climate change. It goes beyond traditional management, based on specific risk assessments, and accepts the possibility that various disruptive events, including massive migrations, may occur but are not necessarily predictable. Resilience focuses on improving a city's performance against multiple hazards, rather than preventing or mitigating asset loss due to specific events.

Thus, the USF does not limit resilience to the climate dimension, and it includes resilience indicators within all the dimensions. A specific City Resilience Indicators (CRI) Framework has been developed by the Rockefeller Foundation and Arup (2016) and is cross-referenced for some of the USF indicators.

The following are the main initiatives or frameworks whose indicators are cross-referenced in the USF:

- **CPI:** UN-Habitat City Prosperity Initiative, https://unhabitat.org/urban-initiatives/initiatives-programmes/city-prosperity-initiative/.
- **CRI:** Rockefeller Foundation and Arup, "City Resilience Framework," April 2014 (updated December 2015); *Inside the CRI: Reference Guide*, March 2016.
- **EBRD:** Green Cities Programme Methodology, based on work prepared by the Organisation for Economic Co-operation and Development (OECD) and ICLEI-Local Governments for Sustainability for the EBRD.
- **GEF-6:** Global Environment Facility (GEF) Sustainable Cities IAP: Tracking Tool for Child Projects.
- **IDB:** Inter-American Development Bank, "Annex I: ESCI Indicators," in "Methodological Guide: Emerging and Sustainable Cities Initiative," 2nd ed., July 2014, https://drive.google.com/a/iclei.org/file/d/0B93Bl6qR3zQ_OXgyN3lwMURqNE0/view.
- **ISO 37120:2014:** "Sustainable development of communities—Indicators for city service and quality of life" (ISO 2014).
- **SDGs:** "Annex IV," in *Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators* (E/CN.3/2016/2/Rev.1), March 2016, https://sustainabledevelopment.un.org/content/documents/11803Official-List-of-Proposed-SDG-Indicators.pdf.
- **WDI:** *World Bank, World Development Indicators 2017* (Washington, DC: World Bank, 2017), https://data.worldbank.org/products/wdi.[22]

[22] The World Development Indicators database is the World Bank's premier compilation of cross-country comparable data on development. It contains more than 1,400 time series indicators for 217 economies and more than 40 country groups, with data for many indicators going back more than 50 years. These indicators can be used to compare cities' sustainability performances to national performances, and many of them can be disaggregated at city level.

Further Information

The dimensions, focus areas, and indicators that form the GPSC Measuring Framework have been identified through review of the following:

- SDGs (UNSD 2017), with particular reference to SDG 11 (UN-Habitat 2016b);
- The commitments and themes expressed within the New Urban Agenda (UN-Habitat 2016a); and
- The commitments within the Paris Agreement on Climate Change (UN 2016) and the subsequent interpretation of these commitments for cities (C40 Cities and Arup 2017).

The identification and selection of the indicators have been informed by the following references:

- ISO 37120: "Sustainable development of communities—Indicators for city service and quality of life" (ISO 2014);
- Indicators for the Global Environment Facility Integrated Approach Pilots; and
- Indicators for Inter-American Development Bank's Methodological Guide of the Emerging and Sustainable Cities Initiative (IDB 2014).

Central to the sustainability transformation is an integrated planning approach coupled with a long-term vision of sustainable growth.

GPSC held a Sustainable Cities photo competition in October 2017. This winning photo was taken by Oyelowo Eyitayo in Nigeria and shows a line of solar panels in the middle of a road. The photo is very telling – the town may be struggling for basic services, but it's already trying to utilize renewable energy for street lighting. From this photo, we can clearly see the town's aspiration, despite the challenges it is facing. Just like this, urban sustainability can start with a small step. And in time, many small steps become enough to push an initiative into the stratosphere – because transformational change doesn't happen overnight.

Source: © Oyelowo Eyitayo. Reproduced with permission from Oyelowo Eyitayo; further permission required for reuse.

ENABLING DIMENSION 1: Governance and Integrated Urban Planning

Goal

To achieve integrated, well-planned urban development that responds appropriately to shifting opportunities and challenges

Context

Complex urban challenges do not follow spatial or administrative boundaries, nor can they be addressed by isolated sectors or actors alone. Central to the sustainability transformation is an integrated planning approach coupled with a long-term vision of sustainable growth that extends beyond a political term. Although the concept of integrated urban development is not new, a tendency to "think in silos" is still prevalent in many municipal administrations. Many city governments, even those from relatively developed countries, still find it challenging to break down silos and foster collaboration between various agencies. When individual sector strategies fail to take codependencies or interdependencies with other sectors into account, the result is not only conflicts of interests but also an inability to address cross-sectoral challenges.[23]

Cities need to take a more holistic approach to sustainability challenges and avoid addressing each issue in single departments. The GPSC promotes an integrated approach that breaks down sector silos and encourages cooperation across various sectors and disciplines. The integrated approach means that all policies, projects, and proposals will be considered in relation to one another. In this regard, synergies between the elements of the integrated urban plan should ensure that the plan as a whole has a greater impact than the sum of its individual parts, if implemented in isolation.

Urban efficiency improves not only because cities adopt new sectoral policies and approaches, but also, more critically, because they can adapt governance practices and organizations to bundle policies in a more integrated way.[24] Many cities already demonstrate successful approaches to integrated urban development. They have an overall strategy to foster cross-sectoral and multilevel coordination. They also have dedicated environmental departments, structured communication, data sharing, and joint target setting by departments with different responsibilities.

Fast-growing cities can transform and become more inclusive and people-friendly by utilizing granular, contextual, and integrated planning approaches based on data and indicators. Good planning shapes urban forms that offer a variety of land use patterns in vibrant neighborhoods and intensities of development articulated with transit accessibility. Such approaches must include attention to details such as local area development plans, streetscape improvements, public space provision, urban design, good connectivity, and place making. Planning needs

[23] For instance, a city's performance in one category, such as transport, is linked to the successes or failures of others, such as air quality.
[24] Integrated planning allows cities to integrate a multiplicity of initiatives that reinforce each other. It considers physical, economic, social, and other aspects of the city as a whole and integrates social and cultural infrastructure early in the planning and design of the physical environment. Cities function best when their urban form, pattern, and design sympathetically consider their inhabitants' culture, needs, and aspirations.
Image: Copenhagen Skyline by Alex Berger, CC BY-NC 2.0, www.flickr.com/photos/virtualwayfarer/14988122882.

to be implemented to allow greater dynamism and flexibility, so that it can better respond to short-term needs while taking a long-term view of urban development (Ellis and Roberts 2016).

The USF identifies integrated urban planning as an enabling dimension. It encompasses key focus areas that are critical to, and cut across, all four of the outcome dimensions: urban economies, natural environment and resources, global climate and resilience, and inclusivity and quality of life. The following are the key focus areas and indicators that fall within the integrated urban planning dimension:

1.1 Vision and long-term strategic planning;
1.2 Stakeholder participation;
1.3 Data management;
1.4 Trend analyses;
1.5 Land use and zoning;
1.6 Urban growth patterns;
1.7 Informal settlements;
1.8 Transport and mobility integrated with land use; and
1.9 Cultural heritage.

Assessment and Measurement

1.1 Vision and Long-term Strategic Planning

Subgoal	***To guide long-term strategic planning through the articulation of a clear vision for the future***
Rationale	Central to the sustainability transformation is an integrated strategic planning approach coupled with a long-term vision of sustainable growth that extends beyond a political term. Strategic planning is the process by which the city determines what it intends to be in the future and how it will get there. The city determines the necessary priorities and strategies to achieve its vision. Included are measurable goals that are realistic and attainable, but also challenging—with an emphasis on long-term goals and strategies, rather than short- term (such as annual) objectives. Strategic planning assumes that certain aspects of the future can be created or influenced by the city. Strategic planning is ongoing; it is the process of self-examination, the confrontation of choices, and the establishment of priorities.
Key question(s)	Has the city identified key issues, challenges, and choices to be addressed as part of the strategic planning effort? Has the city encouraged its agencies and citizens to develop a shared vision? Has the city developed a clear long-term vision for the future, and are there processes in place to ensure this informs planning and decision making? Does the strategic plan include clear and measurable accomplishments with intermediate goals, milestones, and procedures for monitoring progress?
Indicators	• Existence of vision and long-term planning and strategy (GSPC); • Number of planners per capita[25] (GPSC); and • Existence of an implementation process with measurable goals and indicators for monitoring progress (GPSC).

[25] This indicator may be used as a proxy of planning capacity.

1.2 Stakeholder Participation

Subgoal	***To ensure that city planning and decision making benefit fully from the perspectives and views of all stakeholders, and that good relations with stakeholders, including civil society, are maintained***
Rationale	A transparent, integrated, and inclusive process to include a wide range of stakeholders will help align different perspectives and goals to a common end, and will leverage knowledge. Engagement with all relevant stakeholders will ensure that a city's long-term vision, decision making, and planning is informed by multiple perspectives on the city's needs, opportunities, and assets. Active participation by stakeholders in city decision making also helps strengthen relationships and widens the sense of ownership of city strategies and plans. It can improve the quality, acceptance, and effectiveness of projects and proposals.
Key question(s)	Has the city undertaken a detailed analysis of key stakeholders for its projects? Does it understand stakeholder needs, priorities, and interests? Does the city government seek participation from key stakeholders? Is the city developing effective communication to keep stakeholders well informed, motivated, and keen to participate?
Indicators	• **CORE:** Presence of a structure that allows civil society to directly participate in urban planning and management and that operates regularly and democratically (SDG 11); and • Number of stakeholders involved in decision-making activities, and mechanisms to encourage community engagement (CRI).

1.3 Data Management

Subgoal	***To fully integrate data collection, management, and sharing across city departments and partner agencies***
Rationale	Keeping track of progress increases transparency and is one of the first steps to incentivizing progress. Recording and presenting the municipality's progress electronically makes the entry and diffusion of this information more efficient. An effective and transparent data governance process is critical for establishing and monitoring indicators and for evidence-based planning. Given the interrelations between city systems, an integrated approach to data collection, management, and sharing is critical. Platforms that bring together data from across city departments and partner agencies can serve as powerful tools to support an integrated approach to urban planning and management.
Key question(s)	How are data collected, collated, and shared within the city? Are data georeferenced in a common platform (including socioeconomic data)? What is the level at which data are disaggregated?[26]
Indicators	• Years since census with city-level data (GPSC); and • Existence of a geographic information system (GIS) platform and level of data sharing and integration between city agencies (GPSC).

[26] Are there plans to increase the level of disaggregation to achieve a more fine-grained understanding of the city and its past and future evolutions?

1.4 Trend Analyses

Subgoal	***To ensure that city planning and decision-making processes are informed by accurate and robust data, with trend analyses***
Rationale	Access to comprehensive, accurate data is crucial to inform planning and decision making within a city. Effective strategic long-term planning requires analysis of data based on regular monitoring and trend analyses so that the city can develop appropriate responses to emerging opportunities and challenges. Sharing spatial data disaggregated at fine resolution on common platforms between different urban agencies is key to including sectoral plans within more integrated planning efforts and to monitoring plan implementation. Creating open data platforms is also key to engaging stakeholders and citizens.
Key question(s)	Does the city have access to comprehensive, up-to-date data sets and trend analyses on which to base its strategic planning activities? Are these data sets (in particular socioeconomic data) spatially georeferenced, and do the different urban agencies use a common data standard?
Indicators	• Population and projected growth in the next 10 to 20 years (GEF); • Population density[27] with time series and future trends (population/built-up area) (IDB, EBRD); • Job density[28] with time series and future trends (number of jobs/built-up area) (GPSC); and • Demographic structure: dependency ratio and expected trend (WDI).

1.5 Land Use and Zoning

Subgoal	***To ensure appropriate development of the city by creating and implementing integrated land use and zoning plans***
Rationale	Long-term-horizon concept plans define the city's spatial structure with broad land allocation, factoring in long-term population needs, economic growth projections, and so forth. Medium-term master plans (usually having a 10- to 15-year time horizon and reviewed every five years) define detailed and granular land use intensity as well as accompanying layers such as urban design, conservation guidelines, and so forth. Land use and zoning plans provide a consistent and coherent plan for development of the city over the short to long term. They should align with the city's vision for the future as expressed in its infrastructure, economic strategies, and trend projections. These should be developed in an integrated manner in collaboration with all city departments, partner agencies, and other key stakeholders. They should include inbuilt flexibility in zoning codes and planning incentives to allow some variation in planning and design parameters.[29]
Key question(s)	Is development across all parts of the city controlled and managed in line with up-to-date land use plans and aligned with national strategies? How is coordination between different urban agencies organized for producing/updating land use plans? Does the city have strong enough governance and institutional capacity to develop plans and monitor their implementation? How is land supply planned in tandem with market demand and cycles? What are the instruments to ensure both compliance and institutionalized methods allowing the flexibility of planning parameters—are changes based on the merits of a proposed development or motivated by land value capture opportunities?

[27] For large cities and for planning purposes, these data (when available) should be disaggregated at district scale and/or at finer statistical scales such as TAZs (Transport Analysis Zones).
[28] This indicator is also a measure of economic concentration fostering economies of agglomeration. When data are available, they should be disaggregated at district scale and/or at finer statistical scales such as TAZs.
[29] This flexibility is critical to ensure that cities can achieve sustainable patterns of development that meet their future needs while also allowing for adaption to unexpected changes and market responsiveness.

Indicators

- **CORE:** Average share of the built-up area of a city that is open space for public use by all, by sex, age, and disability status (for instance are buildings constructed to be accessible for the elderly) (SDG 11);
- **CORE:** Proportion of national population living in cities that implement urban and regional development plans integrating population projections and resource needs, by size of city (SDG 11);
- Years since land use plan was reviewed and updated (not having a land use plan scores 0 automatically) (GPSC);
- Density, integrated land use: Transit-oriented development promoted (EBRD); and
- Use of existing built-up areas: Mixed-use development promoted through zoning regulations/incentives (EBRD).

1.6 Urban Growth Patterns

Subgoal	***To control expansion of the city and achieve compact growth while providing enough land per capita for adequate housing, public services, and basic physical and social infrastructure***
Rationale	Controlling expansion of the city into undeveloped areas is important to preserve natural habitats and agricultural resources. Cities that are more compact[30] and dense provide connections through greater proximity. Compact cities reduce car dependency, energy consumption, and carbon emissions; they also require less infrastructure, are more effectively served by public transport networks, provide more opportunity for social interaction, and generate many economic benefits by concentrating businesses in close proximity to each other. Compact growth increases access to a high number of diverse job opportunities, in particular for the urban poor. Enough land per capita should be provided for housing, for physical infrastructure (roads, public spaces, wastewater, sewage, etc.), and for social infrastructure (public services, education, health care, etc.).
Key question(s)	Does the city have effective policies and plans in place to limit urban sprawl? Does the city encourage increasing densities along transit corridors with land use regulations such as floor area ratio (FAR)?[31] Does the city have plans to provide enough land per capita for public services, adequate housing, and basic physical and social infrastructure?
Indicators	• **CORE**: Ratio of land consumption rate to population growth rate (SDG 11); • Annual growth rate of built-up areas[32] as a percentage of total area (IDB, EBRD); • Built-up land area (m^2) per person and its evolution over the last two decades (GPSC); and • Percentage of urban development that occurs on existing urban land rather than on greenfield land[33] (EBRD).

[30] Compactness is an important geometric property of urban shapes and is different from density. An urban shape can be compact and dense or compact and not dense. Density measures intensity of land use; compactness measures key shape properties of the urban footprint. A compact city is one closely and firmly packed, with component parts closely fitted together, and not dispersed and fragmented. In purely geometric terms, if two cities have the same built-up area, then residents in the more compact city will have to travel a shorter distance, on average, to the city center or to any location in their city.

[31] FAR is the ratio of a building's total floor area to the area of the piece of land upon which it is built. The term can also refer to limits imposed on such a ratio. As a formula: FAR = (total amount of usable floor area that a building has / land zoning area). Allowable FAR has a major impact on the value of the land. Raising allowable FAR can usually equate to higher land value. Flexible FARs can be used as a land value capture instrument.[25] This indicator may be used as a proxy of planning capacity.

[32] This indicator measures average annual growth rate of the areal urban built-up areas (excluding green space and vacant land) within (and outside) the city's official limits. The data should be collected from the building permits database, once a year, or analyzed with remote sensing tools.

1.7 Informal Settlements

Subgoal	***To prevent, rehabilitate, and upgrade informal settlements and slums to improve their access to basic infrastructure and social services while reducing vulnerability***
Rationale	Communities living within informal settlements are often without access to safe water and sanitation, basic infrastructure, and public services. This leads to poor health and education outcomes, reduced livelihood opportunities, and environmental degradation. Insecure land tenure discourages investment in informal settlements and prevents rehabilitation.
Key question(s)	Are informal settlements present within, or adjacent to, the city, and does the city have effective policies in place to prevent and rehabilitate informal settlements?
Indicators	• **CORE**: Proportion of urban population living in slums, informal settlements, or inadequate housing (SDG 11, CRI); • Proportion of total adult population with secure tenure rights to land and legally recognized documentation who perceive their rights to land as secure, by sex and by type of tenure (SDGs, CRI, modified ISO 37120); • Percentage of substandard housing (IDB); and • Informal settlements as percentage of city area (GEF, CPI).

1.8 Transport and Mobility Integrated with Land Use

Subgoal	***To maximize use of sustainable mobility options and integrate transport planning with l and use planning***
Rationale	Accessibility within cities is partly determined by the distance between where people live and where people work. People generally move between those two points using private or public motorized transport.[34] Policies that encourage high-density, mixed-use, balanced, transit-oriented development—with jobs close to homes and walkable streets—are vital to reduce private car use and increase the financial viability of public transport. Land value increases created by improved accessibility can be captured by local governments to further finance provision of public transport infrastructure. Efficient mobility integrates labor and consumer markets and is a driver of economic development. Transport policy relates to regional integration, to economic performance and competitiveness, to access to jobs, to affordability and an inclusive society, to quality of life, and to public health. As utilizing transportation can represent a significant challenge for households in poverty (Venter 2011), inclusion of transportation cost considerations in planning decision processes can make neighborhoods more assessable and affordable for residents to live in.[35] Cities can also reduce carbon emissions and improve health and well-being by promoting walking, cycling, and use of public transport and low-carbon or zero-carbon vehicles.
Key question(s)	Has there been within the last two years an origin/destination survey covering the urban or metropolitan area? Is there a published transport master plan based on the results of the survey and other supporting studies? Has the city implemented a transport management system, including various indicators for measuring and monitoring the transportation system? Is transportation planning integrated with land use planning, economic planning, and pro-poor policies? Has the city set coordination mechanisms, policies, and incentives to encourage integration of transit with higher density, urban design quality, and provision of local jobs? Are land value capture financing instruments integrated in transit infrastructure financing schemes?

[33] This indicator measures the ratio of urban development that occurs on brownfield sites to the urban development that occurs on urban fringe greenfield sites. The data should be collected from the building permits database once a year.
[34] The essential characteristics of transport infrastructure include the connectivity of street networks and the proportion of urban area covered by streets, as well as the quality of road and rail networks and other public transport infrastructure (Rode et al. 2014)
[35] Planning for location efficiency considers both transportation and location in calculating costs for households and provides affordable transportation options aligned with affordable housing.

Indicators

- **CORE**: Proportion of population that has convenient access to public transport, by sex, age, and disability status (SDG 11);
- Balanced transportation demand: Jobs-to-housing ratio[36] (IDB);
- Number of jobs accessible in 20, 30, and 45 minutes from different city locations[37] (GPSC);
- Proportion of the population living within 20 minutes of everyday services (grocery stores, clinics, etc.)[38] (EBRD);
- Share of population having access to public transport within 15 minutes by foot[39] (EBRD);
- Average commuting time and distance from residence to work[40] (IDB, EBRD);
- Road congestion: Average travel speed on primary thoroughfares during peak hours (km/h) (IDB, EBRD);
- Traffic demand is managed (congestion charges, smart technologies) (EBRD);
- Motorization rate: Number of vehicles per capita[41] (IDB, EBRD);
- Transport modal share in commuting[42] (car, motorcycle, taxi, bus, metro, tram, bicycle, pedestrian) (IDB, EBRD);
- Length and surface coverage of roads per square kilometer, split between wealthy and deprived areas[43] (GPSC);
- Kilometers of road dedicated exclusively to public transit per 100,000 population[44] (IDB, EBRD);
- Kilometers of bicycle path per 100,000 population[45] (IDB, EBRD);
- Total walkway kilometers of dedicated pedestrian paths per 100,000 inhabitants (IDB);
- Transportation affordability index: (number of trips times average cost per trip) / (per capita income of the bottom quintile of the population) (IDB);
- Transportation fatalities per 1,000 population (IDB, CPI); and
- Resilience of transport systems, interruption of public transport systems in case of disaster[46] (EBRD).

[36] The employment-to-housing ratio measures employment opportunities for the labor force living in a given geographic area. It is usually measured in terms of the proportion of jobs per household. Geospatial tools allow planners to map the ratio at a fine-grained spatial resolution and to identify areas that would help to incentivize the creation of local jobs.

[37] This indicator links transportation efficiency, climate change mitigation (by reducing the commuting flows in areas where a high number of jobs is accessible at short distances), economic efficiency (by increasing agglomeration), and social inclusiveness (by allowing cities to identify and prioritize areas with combined poverty and job access deprivation). It has been utilized in the strategic plan OneNYC (see annex D) to prioritize additional public transportation in New York, where access to jobs within 45 minutes varies widely—from 70,000 to more than 2 million depending on location. The World Bank has developed geospatial tools to perform these calculations at fine-grained spatial resolution; see Li et al. (2016).

[38] This indicator measures the proportion of the population living within 20 minutes by any mode of transport to everyday services. The data should be collected through surveys once a year.

[39] This indicator can be calculated on average, and for planning purposes cities would benefit from using geospatial data tools to disaggregate it at fine spatial resolutions. The indicator can also be calculated by surveys.

[40] This indicator measures average time and distance traveled by all commuters to work. It provides information on the level of integration of transportation and land use. The data should be collected through surveys once a year.

[41] This indicator measures the number of private vehicles (cars, motorcycles) per capita. It can be calculated by dividing the total number of vehicles (obtained from the vehicle registration database) by the total population. The data can be collected biannually. See European Environment Agency, "Size of the Vehicle Fleet," http://www.eea.europa.eu/data-and- maps/indicators/size-of-the-vehicle-fleet/size- of-the-vehicle-fleet-2.

[42] This indicator measures the number of commuters working in the city who use each of the listed modes of transport divided by the number of commuting trips to work. Surveys are a common data collection method. The data can be collected biannually. Supplementary metric: Percentage of commuters using a travel mode other than a personal vehicle (as a percentage of total commuters) (ISO 37120).

[43] This indicator links transportation connectivity and social equality. Geospatial tools allow simultaneous mapping of deprivation and critical infrastructure provision such as transportation (see for example the Johannesburg Spatial Development Framework described in City of Johannesburg Metropolitan Municipality [2016]).

[44] This indicator measures the total centerline kilometers dedicated exclusively to busway and railway, divided by 100,000 of city population. The data should be collected once a year.

[45] This indicator measures the total centerline kilometers dedicated to bicycle paths, divided by 100,000 of city population. The data should be collected once a year.

[46] This indicator offers a qualitative assessment of the ability of public transport systems to run efficiently during a natural disaster (such as a flood, earthquake, or storm).

1.9 Cultural Heritage

Subgoal	***To protect and conserve cultural and historical heritage***
Rationale	Protecting and conserving a city's cultural and historical heritage (encompassing tangible heritage such as monuments, historical urban fabric, and archaeological sites as well as intangible heritage such as oral traditions, performing arts, and rituals) helps to reinforce local identity and culture. This result benefits the city by enhancing social cohesion and encouraging a sense of pride in the city. It also strengthens the appeal of the city to businesses and tourists.
Key question(s)	Are there effective policies and plans in place to protect and conserve cultural and historical heritage? Are there protected heritage neighborhoods with effective regulatory frameworks? Does the city improve heritage awareness through knowledge and educational activities?
Indicators	• **CORE:** Total expenditure (public and private) per capita on the preservation, protection, and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed, and World Heritage Centre designation); level of government (national, regional, and local/municipal); type of expenditure (operating expenditure/investment); and type of private funding (donations, private nonprofit sector, and sponsorship); and • Number of World Heritage sites within 100 km (GPSC).

ENABLING DIMENSIONS 2: Fiscal Sustainability

Goal

To ensure transparent, accountable, and effective management of the city and its finances

Context

City governments need adequate financial reserves in order to function—e.g., to pay staff or to deliver services and planning activities. Sound financial management ensures that financial resources are robust, collected efficiently, and used strategically, while the city operates within its budget. Careful structuring of city budgets will help to ensure that funds are available for regular investment in infrastructure and emergency planning and response. This in turn helps to promote long-term financial stability of the city government and also enables the government to adapt to changing circumstances and respond to emergencies.

The feasibility of sustainability policies and spatial planning instruments is highly dependent on a city's financial and governance capability. Cities are best able to combine sustainability and shared prosperity through effective urban governance, transformational leadership, citizen engagement, multi-stakeholder planning, and deployment of appropriate and effective policies, laws, and regulations. Meanwhile, openness and transparency about how city finances are managed, and how city decisions are made, can help strengthen trust in the city's leadership.

A city's fiscal sustainability is the ability of its government to sustain an adequate level of ongoing administrative and urban services using its total recurrent revenues, while also investing in infrastructure improvements to meet the foreseeable growth in demand for city services. Unsustainable levels of debt or other liabilities harmful to the fiscal position of cities can cause a vicious cycle of growing debt, which diverts funds away from productive investments and so reduces the potential for economic growth.

Fiscal sustainability requires an enduring commitment to sound financial management by the city and a supportive fiscal enabling environment. It entails prudent management of the operating budget (revenue and expenditure), the capital budget (investment in infrastructure), liquidity (cash flow), and debt. It also entails a fiscal framework that assigns adequate revenue sources; allows adjustment of tax, tariff, and fee rates when necessary; and provides formula-based revenue transfers that are predictable and timely. City governments should also engage in continual strategic forecasting of future revenues and liabilities, environmental factors, and socioeconomic trends in order to adapt financial and spatial planning accordingly. For fast-growing cities, it is critically important to access long-term financial markets to help fund the numerous investments required in urban infrastructure. This step is not possible for cities lacking fiscal sustainability and effective governance. The USF identifies fiscal sustainability as an enabling dimension. This dimension encompasses key focus areas that are critical to, and cut across, all four of the outcome dimensions.

The following are the key focus areas under this dimension:

2.1 Accountability and transparency;
2.2 Creditworthiness;
2.3 Revenue and financial autonomy;
2.4 Expenditure management; and
2.5 Management of debt and other obligations.

Measurement and Assessment

2.1 Accountability and Transparency

Subgoal	***To build and maintain trust in the city government and ensure accountable management and appropriate use of public resources***
Rationale	Transparency and accountability in the use of public resources are essential to ensure the trust of civil society in the city government. Cities, and the public officials who run them, must be able to demonstrate that their budgets, projects, and policies are responsive to citizens' needs. Accountability can be enhanced when the city leadership is directly elected by the people of the city and demonstrates that it is acting in the interests of the r esidents. Transparent and accountable auditing and scrutiny of public services can deter corruption and the misuse of city funds. Effective efforts to eliminate Corruption will help to reduce wasteful use of resources.
Key question(s)	Are there effective systems in place to ensure accountability of city government in its management and use of public resources? What are the actions undertaken for developing an accountability/transparency framework that acknowledges the importance of (1) information (through an open data approach), (2) enforcement (focusing on the community and the need to meet customer satisfaction and legal compliance obligations), and (3) participation (based on a partnership approach with an engaged community)?
Indicators	• Existence of electronic systems for tracking the municipality's management (yes/no) (GSPC); and • Percentage of municipal government accounts audited (GSPC).

2.2 Creditworthiness

Subgoal	***To demonstrate fiscal sustainability and creditworthiness by achieving a national scale investment-grade credit rating***
Rationale	Already under pressure, infrastructure and basic services such as transport, solid waste management, education, and sanitation will need to be expanded significantly in order to serve developing cities' growing populations. The investment required is immense: developing countries need an additional $1.3 trillion of investment in public infrastructure each year just to keep pace with current demand (World Bank 2018). However, the traditional sources of financing utilized by central governments and international aid organizations won't be nearly enough to meet this demand. To secure the required funding, cities will need to access private sources of long-term financing through local capital markets and commercial partnerships—and to do this they will need to demonstrate that they are financially sustainable. Cities can measure and benchmark their financial sustainability through national scale credit ratings that show the domestic financial community that they are creditworthy. Credit ratings represent a standardized independent assessment of a city's financial situation and specifically its ability to fulfill its financial commitments, including the repayment of debt. By allowing cities to access loans and issue municipal bonds, they make it possible for cities to finance infrastructure through capital investments and other means.

Key question(s)	Is the city engaging, or planning to engage, with private sector investors? Has the national government developed an enabling legal and regulatory, institutional, and policy framework or responsible subnational borrowing? Are there national scale credit ratings of cities in this country? If yes, does the city have a credit rating, and if so, does it have a national scale investment-grade credit rating and what is that rating? If not, does the city envision obtaining a rating in the near future?
Indicators	• A credit rating or shadow credit rating on the national credit rating scale of the country (GPSC).

2.3 Revenue and Financial Autonomy

Subgoal	***To maximize autonomy over city finances***
Rationale	A city's viability, independence, and control over its own resources are all affected by the balance between a city's own source of income and higher-level government transfers. If a city depends on funding from regional or national government for revenues to deliver its services to the public, then it may have less ability to conduct financial planning and less control over its own budget.
Key question(s)	To what extent does the city have access to and transparent control over diverse revenue streams? Which revenue sources are managed directly by the city, and do these generate sufficient revenue to cover the city's operating expenditures? How are municipal taxes collected, and what percentage of taxes due is actually collected? Are there revenue sources (own sources or transfers) that are dedicated to specific expenditures in either the operating or capital budget? Is the city financially autonomous or heavily dependent on other levels of government for its overall financing or for financing some sectors of its development?
Indicators	• Own-source revenue as a percentage of total revenue[47] (ISO 37120, IDB, CRI); • Utility cost recovery (percentage) (IDB); and • Taxes collected as a percentage of taxes billed (IDB).

[47] This metric explores how much control the city government has over its revenue. It examines whether it operates with a degree of economic independence or depends on central government allocation. Own-source concerns local government revenues originating from local fees, charges, and taxes. This amount is expressed as a percentage of total revenues that include all revenues provided by other levels of government, including formula-driven payments or repatriation of income tax and grants from higher levels of government.

2.4 Expenditure Management

Subgoal	***To ensure effective management of the city budgets***
Rationale	To ensure financial sustainability, cities must plan for both operating and capital investment expenditures, and they must achieve a consistent positive operating margin (surplus of operating revenues over operating expenditures). To ensure transparency and accountability, they must execute operate and capital expenditure budgets in accordance with plans. A system of indicators and goals to accompany the budget helps to ensure that money is spent in a way that produces desired results. More specifically, it helps to (1) promote transparency and accountability in the budgeting process; and (2) allocate resources more effectively.
Key question(s)	Does the city have operating and capital investment plans that guide the preparation and execution of annual operating and capital budgets? Does the city have an operating margin surplus of operating revenues (own source and transfers) over operating expenditures? Has the city experienced any cash shortages during the last several fiscal years, and if so, how were they managed? How is budget execution tracked? Are there measurable indicators and goals?
Indicators	• Operating margin (operating revenues from all sources minus operating expenditures in all categories) (GPSC); and • Performance indicators and goals for tracking budget execution (IDB).

2.5 Management of Debt and Other Obligations

Subgoal	***To adequately manage debt and other obligations***
Rationale	A city's financial obligations (liabilities) have a major impact on its financial sustainability. If obligations become greater than the revenue and reserves available to pay them, the city is financially unsustainable. To be sure of having access to the capital required for maintaining and expanding essential infrastructure, cities must carefully manage their financial obligations. Lenders and investors will look carefully at the city's current debt (long or short term, fixed or variable interest rate, to be paid in local currency or foreign currency); the debt service burden; the needs for future debt financing; and other liabilities and contingent liabilities and how they are funded. In some cases, a serious risk to the fiscal management of a city comes from contingent liabilities—that is, liabilities that do not necessarily appear in the municipal government's budget or balance sheet because they are not due to be paid in the short term. These become a risk if they materialize without sufficient reserves to pay them when they are due. Adequate management of debt and other obligations require keeping current and future mandatory payments within the limits of revenues and reserves available to make those payments. It is also essential that cities use long-term debt only to finance well-planned capital investments (such as infrastructure), and that they repay all short-term debt in the same fiscal year in which it was incurred. Cities also need to be careful not to incur debt in a currency different from the one in which they obtain revenues. Otherwise they will face foreign exchange risk that they are not able or authorized to manage.
Key question(s)	What are the city's present debt service ratios? Do these ratios indicate that current debt is sustainable? Would additional debt be sustainable?Is all debt denominated in local currency? Is all short-term debt repaid within the fiscal year it is incurred, or is any of it rolled over to the next fiscal year? Does the growth rate of either short-term or long-term debt exceed the growth rate of revenues available for debt service, and if yes, what measures are being taken to reduce the debt? Are the city finances at risk due to contingent liabilities?
Indicators	• Debt service ratios (percentage) (IDB): o Ratio of annual debt service payments to total annual operating revenue; o Ratio of annual debt service payments to annual own-source revenues[48] (ISO 37120, CRI); and o Ratio of annual debt service payments to the operating margin when debt service is excluded from total operating expenditures. • Ratio of foreign currency debt to local currency debt (GPSC); • Debt growth (percentage) (IDB); • Average annual rate of growth of the debt in the last three years: o Growth rate of short-term debt; o Growth rate of long-term debt; and o Growth rate of revenues available for debt service. • Total contingent liabilities that the city could be required to pay in the next five years as a percentage of the city's own revenue in the same period (IDB).

[48] The debt service ratio is the total long-term debt servicing costs (including lease payments, temporary financing, and other debt charges) divided by total own-source revenue and expressed as a percentage (ISO 37120).

Urbanization and economic growth go hand in hand. Higher levels of development are correlated with a greater concentration of production and population in cities.

OUTCOME DIMENSION 1: Urban Economies

Goal

To attain sustainable economic growth, prosperity, and competitiveness

Context

In cities that enjoy sustainable economic growth and competitiveness, firms and industries create employment, raise productivity, attract investments, and increase the incomes of their citizens over time.

Worldwide, improving economic development in cities is a pathway to eliminating extreme poverty and to promoting shared prosperity. SDG 8 aims at promoting sustained, inclusive, and sustainable economic growth, as well as full and productive employment and decent work for all.

Urbanization and economic growth go hand in hand, and higher levels of development are correlated with a greater concentration of production and population in cities. However, urbanization does not automatically breed economic success. Even for cities enjoying positive economic trajectories, there are pitfalls along the way. Cities may need to continuously reassess their approach to growth in order to maintain momentum. Sustainable urban economic development results in efficiencies, and also allows better access to opportunities, amenities, and services.

Urban economic development is also often sequenced over time, with cities first experiencing structural transformation of their local economies, resulting in efficiency gains, and later experiencing improvements in productivity. Long-term job growth in cities is usually driven by tradable sectors (World Bank 2015). These sectors drive growth in incomes and provide spillovers for other sectors and hence are critical in determining a city's overall economic development pathway.

The key focus areas for assessment and measurement within this dimension are:

1.1 Economic performance;
1.2 Economic structure;
1.3 Business climate, innovation, and entrepreneurship;
1.4 Labor force;
1.5 Livelihood opportunities;
1.6 Income equality and shared prosperity;
1.7 Global appeal; and
1.8 Connectivity and global links.

Image: Frites and Fiets Cycling Trip by George Weeks at the Academy of Urbanism, CC BY-NC-ND 2.0, www.flickr.com/photos/academyofurbanism/37685715116.

Assessment and Measurement

1.1 Economic Performance

Subgoal	***To achieve economic growth and prosperity while reducing environmental impacts in absolute terms***
Rationale	Cities are engines of local, regional, and national economic development. Agglomeration effects (the productive efficiencies that result from colocation of firms) are integral to urban economic development. Agglomeration effects tend to be spatially bound. With its economies of scale and shared infrastructure, the city is the natural scale of job pooling where knowledge can be transferred between businesses. In particular, companies providing high-value-added services need face-to-face interactions and knowledge exchange. Urban economic development is intricately linked to—and often a prerequisite for—service delivery, investments in infrastructure, and poverty reduction in cities. Cities that are more competitive have the ability to set aside additional resources to meet the needs of their citizens and the challenges of the future. Yet in order to grow, the economy may require natural resources and emit waste that pollutes land, water, and air and contributes to impacts on the global climate. Thus, cities in developing countries may need to tackle trade-offs between growth and environmental efficiency. Sustainable urban economic growth should be linked to increasing the efficiency of resource use, reducing carbon emissions in absolute terms, and encouraging low-carbon and climate-smart investments.
Key question(s)	Does the city demonstrate competitiveness—gross domestic product (GDP) growth per capita, job growth, and growth of incomes? Is the city economically dense enough to promote agglomeration economies? Is the economic growth environmentally sustainable?
Indicators	• GDP per capita, including growth rate (SDGs, WDI, GEF, IDB, CPI); • GDP energy intensity (primary energy use/unit of GDP)[49] (SDGs, WDI); • GDP carbon intensity (annual CO_2 emissions per unit of GDP)[50] (WDI, IDB, EBRD); • GDP per domestic material consumption[51] (SDGs, EBRD); • GDP density (GDP/km^2 of urban built-up area)[52] (GPSC); • Annual growth rate of real GDP per employed person (SDGs); • GDP per person employed[53] (WDI); and • Percentage employment change from the last year[54] (CRI).

[49] This indicator links the cross-cutting issues of economic productivity, energy efficiency, and climate change. Time series of GDP on one side and energy consumption on the other side can be used to assess if the city realizes relative decoupling (decrease over time of the energy intensity of its economy) or absolute decoupling (absolute increase of GDP accompanied by absolute decrease of energy consumption).

[50] This indicator—kilograms of CO2 emissions per 2011 purchasing power parity dollars of GDP—links the cross-cutting issues of economic productivity and climate change. Time series of GDP on one side and CO2 emissions on the other side can be used to assess if the city realizes relative decoupling (decrease over time of the carbon intensity of its economy) or absolute decoupling (absolute increase of GDP accompanied by absolute decrease of carbon emissions).

[51] This indicator measures material resource productivity.

[52] This indicator measures both urban land productivity in relation to infrastructure costs and agglomeration of the economy. It thus assesses impacts on urban productivity in two ways: (1) through productivity of land; and (2) through productivity of labor (which is increased by agglomeration, as suggested by international research). See Salat, Bourdic, and Kamiya (2017).

[53] This indicator is a measure of productive employment.

[54] This metric examines whether overall employment opportunities have increased, decreased, or remained level in the past year. A thriving economy should be evident through positive and steady employment change.

1.2 Economic Structure

Subgoal	***To establish a diverse, competitive, and resilient economic structure***
Rationale	Urbanization economies are a result of matchmaking across labor, infrastructure, and knowledge pools in cities. A diversity of sectors, people, and ideas provides a rich foundation for fostering innovation, which in turn drives productivity growth over time. A diverse economic base also provides economic stability by minimizing a city's reliance on a small number of industries and by increasing access to a larger basket of markets. Thus, diversity is also related to resilience, in that it helps city economies withstand downturns or disruptions within particular sectors, in turn reducing risks for businesses, investors, and workers. Trends in the sectoral composition of the economy show if the city evolves toward higher segments of the value chain and specializes in sectors where it has a competitive advantage.
Key question(s)	Is the city's economy driven by a diverse range of sectors, or does it rely on a small number of sectors? Does the city specialize in sectors where it has a competitive advantage? What are the factors (local and global) behind growth and/or demise of main economic sectors in the city? Is the education level of the labor force high enough to support moving up value chains in global markets?
Indicators	• Manufacturing employment as a proportion of total employment (SDGs); • Sectoral breakdown (GDP, employment) and evolution during the last two decades with disaggregation by gender[55] (WDI); • Location quotients of top-three city economic subsectors (share of subsector in city GDP compared to national share)[56] (GPSC); and • Herfindahl index and evolution over time[57] (GPSC).

[55] This indicator allows assessing two cross-cutting issues: the economy's sectoral composition and women's participation in the highest-value sectors.

[56] A location quotient (LQ) is an analytical statistic that measures a region's industrial specialization relative to a larger geographic unit (usually the nation). An LQ is computed as an industry's share of a regional total for some economic statistic (earnings, GDP by metropolitan area, employment, etc.) divided by the industry's share of the national total for the same statistic. For example, an LQ of 1.0 in mining means that the region and the nation are equally specialized in mining, while an LQ of 1.8 means that the region has a higher concentration in mining than the nation.

[57] The Herfindahl index measures the size distribution of firms within an industry. It is an indicator of the level of competition in a market. It is defined as the sum of the squares of the market shares of the companies of the sector (sometimes limited to the 50 largest companies), with the market shares expressed in fractions. It can therefore range from 0 to 1. An increase in the Herfindahl index generally indicates a decrease in competition. A weak index indicates an atomized market among many competing firms, while an index of 1 indicates a single monopoly producer. More precisely:

- An H below 0.01 indicates a highly competitive industry;
- An H below 0.15 indicates an unconcentrated industry;
- An H between 0.15 and 0.25 indicates moderate concentration; and
- An H above 0.25 indicates high concentration.

1.3 Business Climate, Innovation, and Entrepreneurship

Subgoal	***To create a dynamic business environment to support private sector development and innovation***
Rationale	Cities must retain a competitive advantage to attract and retain business investment. Cultivating and promoting the city as an attractive place for businesses helps to retain capital; it also creates momentum as businesses locate near each other to benefit from economies of scale and reduced transaction costs. An environment that supports local business development and innovation provides greater livelihood opportunities for its population and is less reliant on external economic influence. Such an environment helps to retain economic profit within the city, boosting the local economy and city revenues. Economic growth is driven by learning, innovation, and the accumulation of ideas, skills, and knowledge capital. By supporting local business development and innovation, cities can reduce dependency on external economic influences and create greater economic opportunities for their population. Business climate has been traditionally associated with economic competitiveness of countries, regions, and cities. Bureaucratic barriers deter entrepreneurship and private investment, and thus have major negative consequences for economic performance. Business climate is shaped both by regulations and norms (often established at a national level), and by the way regulations and norms are implemented (which is most often a local issue).
Key question(s)	Does the regulatory environment (e.g., bureaucratic norms and procedures related to starting and operating a business) encourage economic growth and development in the city? Does the business support provided by the national or local authorities address the real needs of the businesses and help them improve productivity? To what extent are there mechanisms in place to promote procurement practices that support local businesses and businesses owned by women and minority groups? To what extent are there mechanisms to provide emergency support to local small and medium-size businesses following a disaster?
Indicators	• Research and development expenditure as a proportion of local GDP (GPSC); • Foreign direct investment (FDI) in capital divided by GDP[58] (IDB); • Number of businesses per 100,000 16- to 64-year-olds (ISO 37120, CRI); • Days to obtain a business license, and change of this number over time (IDB, WDI, CPI); • Number of days the city government takes to grant a construction license (IDB); • Strategic business infrastructure: Existence of a logistics platform (yes/ no)[59] (IDB); • Ease of access to finance (what share of business struggles to access finance, what are the interest rates, what financial tools are offered by banks and by other institutions) (GPSC); • Quality and accessibility of support for businesses (GPSC); and • Number of mechanisms in place to support local small and medium-size businesses following a disaster (CRI).

[58] Supplementary metric: average FDI-attributable jobs over the last three years per 100,000 16- to 64-year-olds (CRI). This is calculated by taking the mean average of annual FDI job figures over the past three years. The city also needs to know the size of its population aged 16 to 64 years old (working population), then divide FDI jobs by this figure and multiply by 100,000.

[59] A "yes" answer means that the city provides specialized facilities exclusively to logistics operators in diverse activities.

1.4 Labor Force

Subgoal	***To invest in local skills and attract talent in line with the current and future jobs marketplace***
Rationale	By aligning the skills of the city's workforce to current and emerging job opportunities, cities can support existing employers and attract new businesses, thus generating the economic dynamism to create new jobs and increase livelihood opportunities for their populations in the long term. A long-term comprehensive strategy is required to help match the skills of the workforce to the current and emerging employment market place in the city.
Key question(s)	Has the labor force participation rate increased or decreased over the last decade, and why? To what extent are there effective mechanisms in place for matching skills to the current and emerging employment marketplace?
Indicators	• Labor force participation rate, and changes over time[60] by gender (WDI); • Vulnerable employment by gender (WDI); • Informal employment[61] as percentage of total employment by gender (adapted from 2016 SDGs, IDB); • Level of education of labor force (GPSC)[62]; and • Percentage of foreign born residents (OECD).

1.5 Livelihood Opportunities

Subgoal	***To facilitate livelihood opportunities for city residents***
Rationale	In a sustainable city, individuals are able to access diverse livelihood and employment opportunities to accrue personal savings that will support their development in ordinary times and their survival in times of crisis. Job creation in cities is at the forefront of the economic development challenge globally. Many developing countries are experiencing a demographic and spatial transition, with millions of new entrants to the labor market. Creating job opportunities in urban areas—quickly—is essential if countries are to take advantage of their "demographic dividend" and thus avoid the social disaster created by unemployment and inequality. Cities need jobs and opportunities for their citizens, and they need the means to generate tax revenues to fund projects that meet the growing demand for basic services.
Key question(s)	Are there diverse, accessible, and appropriate livelihood and employment opportunities? Do employment opportunities match the level of education of the labor force in type and quantity, or is there a mismatch? To what extent are there labor policies and standards in place that effectively deter discrimination and promote fair employment conditions?
Indicators	• Average hourly earnings of female and male employees, by occupation, age, and disability status (SDGs); • Unemployment rate (percentage), and change in rate over time (IDB, CPI, CRI); and • Youth unemployment rate (CPI).

[60] Globally, informal and vulnerable employment accounts for 1.5 billion people, or over 46 percent of total employment. In both southern Asia and Sub-Saharan Africa, over 70 percent of workers are in vulnerable employment.
[61] This is the percentage of the economically active population engaged in informal employment as defined by the International Labour Organization.
[62] This indicator links social inclusiveness (match of jobs and skills) to the ability of the city to move up the value chain in its economic structure and to evolve toward a service (and ultimately a knowledge) economy.

1.6 Income Equality and Shared Prosperity

Subgoal	***To reduce income inequality within the city (across geography and demographic groups) and across the urban system***
Rationale	At the city scale, incomes converge through economic development: as cities develop, an influx of migrants (often from smaller cities or rural regions) leads to an increase in intracity inequality, but subsequently inequality levels tend to decline as cities gradually include migrants in the labor force. Income disparity is not only a problem for the poor; it can blunt economic growth, increase crime, and weaken social cohesion across cities. As hubs of both economic opportunity and economic disparity, cities have a vital role to play in tackling inequality and should consider income disparities across space, across communities, and across demographic groups (i.e., ethnic groups, women, young adults, immigrants, and disadvantaged populations).
Key question(s)	What is the pattern of income disparity across the city and between different demographic, gender, and ethnic groups? Is income disparity geographically concentrated in specific urban areas? How does the per capita provision of physical infrastructure (streets, public space, water and sewage systems, transit stops, etc.) and social infrastructure (public services, education, health, etc.) differ for wealthy and poor urban areas?
Indicators	• Income Gini coefficient[63] (SDGs, WDI, IDB, CPI); • Share of consumption or income, highest 10 percent of population (WDI); • Share of consumption or income, lowest 10 percent of population (WDI); • Annualized growth in mean consumption or income per capita, bottom 40 percent (WDI); • Average income ratio between urban population and neighboring rural population, and changes over time (GPSC)[64]; and • Ratio of access to services between 90th and 50th percentiles (GPSC).

[63] The Gini index measures the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. A Gini index of zero indicates perfect equality, while an index of 100 implies perfect inequality.
[64] This indicator reflects migrations from rural area to urban areas.

1.7 Global Appeal

Subgoal	***To position the city as an appealing place to live, work, visit, or do business***
Rationale	Cities that are able to develop an appealing differentiator (or "brand") are better able to compete with other cities to attract business, skilled workers, and tourists, and thus better able to increase and diversify their potential tax base. The appeal of a city may be based on its cultural or historic heritage, ease of doing business, quality of place, lifestyle, or diversity.
Key question(s)	How attractive is the city as a place to live, work, study, visit, or do business compared to other cities regionally, nationally, and internationally? Has the city put in place a strong and financed policy for enhancing cultural interaction?
Indicators	• Number of visitors from abroad and domestically (GSPC); • Number of international students (GPSC); • Number of foreign residents (GPSC); and • Foreign direct investment as a percentage of total investment (OECD).

1.8 Connectivity and Global Links

Subgoal	***To provide adequate transport and digital connectivity to support economic growth and attract investment***
Rationale	Cities are efficient at providing access to people, goods, services, and information: the better and more efficient this access, the greater the social and economic benefits of urban living. A sustainable city deploys the connective infrastructure—transit infrastructure, airport connectivity, logistics, and information and communications technology—required to sustain both the population and the economy and to provide better quality of life and equitable access to jobs, education, and health. Broadband quality and airport and logistics connectivity support a city's access to global flows of information, high-level services, and goods.
Key question(s)	Is there good connectivity for people and goods between the city and regional and international destinations? To what extent does the city have strong, integrated economic relationships with other cities and regions? Is the city a key node, or is it close to a key node, in global or regional transportation networks (ports, high-speed rail, air)? What is the city's distance from major concentrations of economic density and its location in regional economic corridors? Are communication technology networks effective and reliable across the city?
Indicators	• Proportion of population covered by a mobile network, by technology (SDGs); • Broadband Internet subscriptions per 100 inhabitants (SDGs, WDI, CPI); • Number of national and international routes from nearest airport (GPSC); • Value of city exports as a percentage of city GDP (WDI, CRI); • Value of city imports as a percentage of city GDP (WDI); • International inbound and outbound tourists (WDI); and • Market accessibility due to infrastructure, Rural Access Index, Urban Accessibility/ Mobility Index (World Bank).

OUTCOME DIMENSION 2: Natural Environment and Resources

Goal

To protect and conserve ecosystems and natural resources

Context

The natural environment provides many social and economic benefits and is an essential component of urban sustainability. The environment provides food, water, and other essential commodities. Healthy ecosystems regulate the climate and attenuate the effects of extreme weather events, while improving residents' quality of life and well-being.

However, urbanization and overconsumption of resources are placing great pressure on natural environments. Expansion of urban areas results in loss of natural habitats and decimation of biodiversity. Further environmental degradation can occur if city sanitation, waste disposal, and environmental enforcement systems fail to keep pace with the rate and pattern of urban growth. Meanwhile, increased motorized vehicular and industrial activities can cause significant declines in air quality, with resulting impacts on human health and increased levels of greenhouse gas (GHG) emissions.

But a city's growth and economic development can occur without destroying or degrading the environment; instead, the city's natural assets can be preserved for future generations. Well-planned cities decouple economic growth from environmental pressure by increasing their resource efficiency. Cities provide unique opportunities for patterns of highly efficient consumption and production of energy, water, and materials as well as for circular economies and low-carbon living. High-density development can reduce urban sprawl and relieve the environmental pressures of a burgeoning planetary population. In this way, cities can provide new pathways to sustainable use of natural resources and protection of ecosystems and biodiversity.

The following are the key focus areas for assessment and measurement within this dimension:

2.1 Ecosystems and biodiversity;
2.2 Air quality;
2.3 Water resources management;
2.4 Solid waste management; and
2.5 Consumption and production patterns.

Assessment and Measurement

2.1 Ecosystems and Biodiversity

Subgoal	***To protect, conserve, restore, and promote ecosystems, natural habitats, and biodiversity within and beyond the city boundaries***
Rationale	Healthy and biodiverse ecosystems are vital to the effective functioning of city systems (e.g., they provide water, attenuate floodwater, filter particles from air, promote pollination, help control climate, support nutrient cycles). They also provide health, recreational, cultural, and spiritual benefits to city residents. Avoiding soil contamination is of particular concern for healthy agriculture and protection of human health.
Key question(s)	What are the land cover changes that may be a threat to urban ecosystems and biodiversity? Are ecosystems and biodiversity within the city protected by regulations and effectively implemented actions?
Indicators	• Hectares of permanent green space per 100,000 city residents (IDB); • Share of population within a 15-minute walk of open green space[65] (EBRD); • Enforcement and monitoring of biodiversity regulations (GEF); • Existence and active implementation of a land use plan that includes zoning with environmental protection and preservation zones (IDB); • Abundance of bird species[66] (annual percentage change, all species) (EBRD); • Number of contaminated sites (contaminated sites/1,000 inhabitants or km^2) (EBRD); and • Concentration of mercury in soil (mg/kg) (EBRD).

[65] This indicator of accessibility is used in cities' strategic plans (see for example PlaNYC, described in annex D).
[66] This indicator measures the percentage of change in bird population in one year. The data for the whole city can be estimated from a sample of an inventory of bird population in a given area. The data should be compiled once a year. See European Environment Agency, "Abundance and Distribution of Selected Species," http://www.eea.europa.eu/data-and- maps/indicators/abundance -and-distribution-of- selected- species/abundance-and- distribution-of-selected-2.

2.2 Air Quality

Subgoal	***To maintain adequate air quality levels across the city such that no communities are routinely exposed to unhealthy levels of air pollution***
Rationale	Poor air quality in cities is commonplace as a result of motorized vehicles and industrial emissions. It has widespread impacts on human health, increasing the occurrence of strokes, heart disease, lung cancer, and respiratory diseases, including asthma. Poor air quality also reduces city attractiveness, quality of life, and economic productivity. More generally, pollution has a huge economic cost.
Key question(s)	Does air quality across all parts of the city routinely meet standards that protect human health? What are the measures taken both for reducing source emissions and for protecting public health?
Indicators	• **CORE:** Annual mean levels of fine particulate matter (e.g., PM2.5 and PM10) in cities (population weighted) (SDG 11, EBRD, CPI); • Average annual concentration of NO_x (EBRD); and • Average daily concentration of SO_2 (EBRD). Note: These indicators should comprise averages and spatially disaggregated data, when available.

2.3 Water Resources Management

Subgoal	***To manage water resources in a coordinated manner, without harming the quality and sustainability of surface water and goundwater bodies within and beyond the city boundaries***
Rationale	A reliable, safe water supply is fundamental to a city's viability, yet often the reservoirs and aquifers on which the city relies are located far beyond its geographic and administrative boundaries. It is essential for cities to implement a catchment-wide approach to planning and managing water resources, whereby cities collaborate with all relevant stakeholders within the catchment area to manage demands, establish safe yields, and maintain quality.
Key question(s)	Are city water supplies able to meet demand to provide safe water for all in the long term? What actions are taken to improve water supply systems and to change water consumption patterns?
Indicators	• Level of water stress: Annual freshwater withdrawals, percentage of internal resources (SDGs, WDI, EBRD[67]); • Annual freshwater withdrawals, percentage by sector (agriculture, industry, domestic) (WDI); • Annual water consumption per capita[68] (L/person/day) (GEF, IDB, EBRD); • Water productivity, GDP/water use (WDI, EBRD); • Nonrevenue water: Percentage of water lost in the water distribution system[69] (IDB, EBRD); and • Percentage of residential and commercial wastewater that is treated according to applicable national standards (SDGs, IDB, EBRD, CPI).

2.4 Solid Waste Management

Subgoal	***To minimize waste generation and to minimize environmental impacts of waste by ensuring appropriate collection, treatment, and disposal of the city's solid waste.***
Rationale	Reducing, reusing, and recycling waste reduces pressure on the planet's finite resources. Uncontrolled dumping of waste and disposal in landfill sites without effective pollution controls results in degradation of land, water, and air. Comprehensive collection and appropriate treatment and/or disposal of a city's solid waste helps prevent environmental degradation.
Key question(s)	Are solid waste management practices across all parts of the city effective at reducing waste generation, reclaiming value from solid waste, and minimizing environmental impacts of waste collection, treatment, and disposal?
Indicators	• Total solid waste generation per capita[70] (kg / year / capita) (EBRD); • Share of the population with weekly municipal solid waste collection[71] (percentage) (IDB, EBRD); • Proportion of municipal solid waste that is sorted and recycled[72] (IDB, EBRD); and • Remaining life of current landfill(s).[73] (IDB, EBRD)

2.5 Consumption and Production Patterns

Subgoal	***To achieve sustainable management and efficient use of natural resources***
Rationale	The world's population is growing, and the demand for food, materials, and goods is increasing at an unprecedented rate. Yet there is a finite supply of many natural resources on which we rely. Cities are uniquely well placed to reduce demand on these finite resources through more efficient use, substitution of renewable resources, and implementation of circular economy principles. Sustainable consumption and production aims at "doing more and better with less." It increases net welfare gains from economic activities while reducing resource use, degradation, and pollution along the whole life cycle of the resource.
Key question(s)	Is the city implementing strategies to maximize efficient use of natural resources? Is the city implementing cooperation among actors operating in the supply chain, from producer to final consumer? Is the city engaging consumers through awareness raising and education about sustainable consumption and lifestyles?
Indicators	• **CORE:** Proportion of financial support that is allocated to the construction and retrofitting of sustainable, resilient, and resource-efficient buildings utilizing local materials (adapted SD G11); and • Material footprint per capita and per GDP unit (SDGs).

[67] EBRD Water Exploitation Index (%): The Water Exploitation Index Plus (WEI+) is the total water used as a percentage of the renewable freshwater resources in a given territory and time scale. See European Environment Agency, "Use of Freshwater Resources," http://www.eea.europa.eu/data-and- maps/indicators/use-of- freshwater-resources- 2/assessment-1.

[68] This indicator measures the annual per capita water consumption of residents connected to the city's network. Data can be obtained from the public agency providing the water. The data must be measured several times a year to account for the variability of water consumption levels with the seasons.

[69] This is calculated as percentage of water lost from the amount of treated water entering the distribution system that is accounted for by the water provider. This includes actual water losses (e.g., leaking pipes) and billing losses (e.g., broken water meters, absence of water meters, and illegal connections).

[70] For useful benchmarks, see European Environment Agency, "Waste—Municipal Solid Waste Generation and Management," http://www.eea.europa.eu/soer- 2015/countries-comparison/waste.

[71] The data can be collected annually through surveys.

[72] Formally and informally recycled materials are those that (following local government permits and regulations) are diverted from the waste stream, partially recovered, and sent for processing into new products.

[73] This indicator measures the remaining useful life of the site of the sanitary or controlled landfill, based on the city's municipal solid waste generation projections (in years). The data can be collected twice a year.

OUTCOME DIMENSION 3: Climate Action and Resilience

Goal

To minimize the city's impact on climate change and foster resilience

Context

Global climate has much to do with the concepts and considerations identified within the natural environment and resources dimension described above. However, the Urban Sustainability Framework identifies climate action and resilience as a standalone dimension in recognition of the importance and urgency of international efforts to curb the impacts of climate change—and the vital role that cities must play in "holding the increase in the global average temperature to well below 2° C above pre-industrial levels, and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels" (UN 2016).

Cities are major contributors to climate change. Despite covering less than 2 percent of the earth's surface, cities consume 78 percent of the world's energy and produce more than 60 percent of all carbon dioxide and significant amounts of other greenhouse gases, mainly through energy generation, vehicles, industry, and biomass use. Analysis shows that cities must reduce per capita emissions by an average of 42 percent to limit global temperature rise to 1.5 degrees and that every city must diverge considerably from current business-as-usual pathways to deliver a climate-safe future (UN-Habitat 2016b).

For rapidly developing cities, options for mitigating climate change include shaping their urbanization and infrastructure development toward more sustainable and low-carbon pathways. In mature or established cities, options will focus on the potential for refurbishing existing systems and infrastructures. Key mitigation strategies include collocating high residential densities with high employment densities, diversifying land use mixes, increasing accessibility to and investing in public transit, and other supportive demand-management measures. These strategies can reduce emissions in the short term and long term (IPCC 2014).

At the same time, cities need to adapt to a changing climate. Adaptation measures range from large-scale infrastructure changes to initiatives to bring about behavioral shifts within the local population. But adaptation to predicted risks is not sufficient by itself. Cities are recognizing that they must build resilience to a wide range of shocks and stresses that are not necessarily predictable. They must position themselves to survive and thrive in an increasingly uncertain future—one where climate change combines with urbanization, demographic change, and globalization to create new and unpredictable risks.

The following are the key focus areas under this dimension:

3.1 Greenhouse gas inventory;
3.2 Energy efficiency;
3.3 Clean energy;
3.4 Climate change adaptation; and
3.5 Disaster risk reduction.

Assessment and Measurement

3.1 Greenhouse Gas Inventory

Subgoal	***To identify the sectors, sources, and activities within the city that are responsible for greenhouse gas emissions so that the city's emissions can be managed and reduced***
Rationale	Cities need a good understanding of the sources and scale of their GHG emissions in order to develop strategies to reduce emissions and monitor progress toward emission reduction targets.
Key question(s)	Does the city use a GHG inventory to identify sources of emissions and prioritize policies to reduce emissions?[74]
Indicators	• Existence of a GHG emissions measurement system with a monitoring system (IDB); • Annual CO_2 equivalent emissions per capita[75] (tCO_2/capita) (SDGs, IDB, EBRD, WDI, CPI); • GHG emissions, total and percentage change (WDI); • Methane emissions, total and percentage change (WDI); and • CO_2 emissions by sector (electricity and heat production; manufacturing industries and construction; residential buildings and commercial and public services; transport; other sectors) (WDI).

3.2 Energy Efficiency

Subgoal	***To maximize energy efficiency in order to reduce the city's greenhouse gas emissions***
Rationale	Reducing energy use through efficiency measures can deliver significant reductions in GHG emissions, with the added benefit of delivering significant monetary savings as well. SDG 7 aims, by 2030, to substantially increase the share of renewable energy in the global energy mix and to double the global rate of improvement in energy efficiency. Besides sectoral measures, integrated urban planning is a powerful instrument for increasing energy efficiency. Key planning policy levers include (1) increasing urban density in low-density cities; (2) aligning transit accessibility and land use intensity to reduce transportation energy; (3) improving city public transit; (4) changing building practices; and (5) changing sources of energy.
Key question(s)	Is the city implementing effective strategies to improve energy efficiency? How are energy efficiency policies reflected in regulatory frameworks and financial incentives?
Indicators	• Total final energy consumption, in GJ per capita per year and average annual growth (WDI, IDB); and • Resilience of the electricity network to climatic extremes: Average share of population undergoing prolonged power outage in case of climatic extremes over the past five years (percentage) (EBRD).

[74] The first step in considering city GHG emissions is to define a GHG baseline of the annual GHG emissions produced in a given geographical area. This requires defining the scope of the emissions being measured and the boundaries of the city unit. The scope of emissions included in the city GHG standard produced by the UN Environment Programme, UN-Habitat, and the World Bank "includes all emissions produced within a city, major emissions from consumption within a city, and major upstream emissions that are attributable to city residents. The question about the relevant boundaries of a city has to do with the unit to measure—strict city boundaries or the metropolitan area. A metropolitan or functional limit of the city may be the best scale to use, especially for larger cities" (World Bank 2010).

[75] This indicator measures CO2 emissions of the city, divided by city population. It controls for the size of city population. Estimates of CO2 emissions must first be made within each sector (transport, electricity, etc.) and averaged.

3.3 Clean Energy

Subgoal	***To reduce greenhouse gas emissions by switching to low-carbon and zero-carbon energy sources***
Rationale	The impact of energy consumption on GHG emissions depends not only on the amount consumed, but also on the mode of energy production and the consequent GHG emitted by those sources. The majority of GHG emissions from cities can be attributed to energy derived from fossil fuels, electricity within buildings, and fuels used by vehicles. Switching to low-carbon or zero-carbon sources of electricity and power can therefore deliver significant reductions in GHG emissions.
Key question(s)	What are the city targets, policies, incentives, and milestones for increasing the share of renewable energies?
Indicators	• Percentage of total energy derived from renewable sources, as share of city's total final energy consumption (adapted from SDGs, EBRD, CPI); and • Proportion of population with primary reliance on clean fuels and technology (SDGs).

3.4 Climate Change Adaptation

Subgoal	***To reduce the risks to the city (and in particular to the poor and vulnerable groups) posed by the consequences of future changes in climate***
Rationale	In the future, climate change will have more and more significant impacts on cities. It will increase the frequency and severity of some natural hazards, especially extreme weather events, and introduce new incremental impacts that are less immediate. The consequences of climate change will be felt on health, livelihoods, and material assets, and will more heavily affect the poorest people, the inhabitants of informal settlements, and vulnerable groups such as women, children, the elderly, and the disabled. SDG 1 aims, by 2030, to build the resilience of the poor and those in vulnerable situations and to reduce their exposure and vulnerability to climate-related extreme events and other economic, social, and environmental shocks and disasters.
Key question(s)	Is the city preparing for and seeking to limit the magnitude and severity of existing and future climate impacts? Has the city developed a comprehensive climate change adaptation plan? Is the city treating vulnerability to climate impacts as a separate concern, or mainstreaming resilience into existing efforts, in particular those concerned with the urban poor and the most vulnerable? Does the city incorporate climate considerations into existing plans, policies, and projects? How does the city finance adaptation to climate change?
Indicators	• Years since the city's climate change strategic plan was updated (CRI).

3.5 Disaster Risk Reduction

Subgoal	***To reduce the risk of disaster caused by natural hazards***
Rationale	A combination of climate change, urbanization, and globalization means cities are more at risk than ever before from natural and man-made disasters (e.g., floods, droughts, cyclones, epidemics, terrorist attacks). Cities can implement prevention and mitigation measures to reduce risk and develop strategies to help them recover in the event that a disaster should occur.
Key question(s)	Has the city undertaken comprehensive disaster risk reduction strategies? Is disaster risk management integrated in city planning (land use, transportation, and water, in particular)? To what extent is there an adequately trained, resourced, and coordinated official emergency response to the immediate aftermath of disasters and major incidents? Are citizens aware of and engaged in contingency plans in case of natural disasters?
Indicators	• **CORE:** Number of deaths, missing persons, and persons affected by disaster per 100,000 people (SDG 11); • **CORE:** Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services (SDG 11, EBRD); • **CORE:** Local disaster risk reduction strategies adopted and implemented in line with the Sendai Framework for Disaster Risk Reduction 2015–2030 (yes/no) (adapted from SDG 11); • Awareness of and preparedness for natural disasters[76] (EBRD); • Population affected by droughts, floods, and extreme temperatures (WDI); • Critical infrastructure at risk due to inadequate construction or placement in areas of nonmitigable risk[77] (IDB, EBRD); • Existence of adequate contingency plans for natural disasters with early warning systems (yes/no) (IDB); and • Existence of risk maps (at an adequate scale for the main hazards threatening the city) (IDB).

[76] This is a qualitative assessment of citizens' awareness of the threats of natural disasters and their means to minimize damages (e.g., insurance, knowledge of shelters, measures to take at the building level, etc.).
[77] This requires identification of urban areas exposed to a disaster (e.g., located in a low-lying area, exposed to a landslide) together with information about the quality of housing in such areas. The data should be collected biannually based on a selected climatic/geological event (e.g., 10-year flood, if flood is the most common type of disaster the city experiences).

OUTCOME DIMENSION 4: Inclusivity and Quality of Life

Goal

To reduce inequalities and provide a decent quality of life for all

Context

Urbanization has the potential to improve city dwellers' quality of life and provide a pathway out of poverty. But all too often, rising inequality and exclusion occur within cities instead. In order to realize the full social and economic benefits of urbanization, cities must value all people and their needs equally, and guarantee equal rights for and participation by all. They must provide equal and affordable access to basic necessities, including food, water, housing, sanitation, and energy. Cities must also ensure that no group is excluded from the benefits of economic growth, regardless of race, religion, ethnicity, or socioeconomic status.

In particular, cities should strive to achieve gender equality and empower women and girls. SDG 5 aims at ending all forms of discrimination against all women and girls everywhere; at eliminating all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation; and at ensuring that women are able to fully and effectively participate in political, economic, and public life, and that they have equal opportunities for leadership at all levels of decision making in these realms.

People are the soul of a city, and ensuring that they lead fulfilling lives (and are able to contribute to others in return) is crucial to any sustainable city. Creating people-centered, livable cities means making them inclusive, equitable, tolerant, and access oriented; they should have good-quality public open spaces and be affordable, healthy, walkable, and pleasant for different groups of people. To foster urban sustainability, cities must provide amenities required for improved living standards, such as social services, education, health, recreation, safety, and security. These will enable the population to maximize individual potential and to lead healthy and fulfilling lives.

The following are the key focus areas under this dimension:

4.1 Housing;
4.2 Education;
4.3 Poverty reduction, hunger reduction, and food security;
4.4 Drinking water and sanitation;
4.5 Basic physical infrastructure;
4.6 Health and well-being;
4.7 Safety; and
4.8 Social cohesion.

Assessment and Measurement

4.1 Housing

Subgoal	***To provide adequate and affordable housing for all***
Rationale	SDG 11 aims, by 2030, at ensuring access for all to adequate, safe, and affordable housing and basic services, and at the upgrading of slums. Safe, adequate housing provides the shelter and security that are essential for the health and well-being of the city's inhabitants. Inadequate housing can lead to long-term social, economic, and environmental challenges for individuals, communities, and the city as a whole.
Key question(s)	Is there an adequate supply of safe and affordable housing to meet demand? Does this housing meet the requirements of residents (in terms of space and quality)? Is housing policy targeted at providing dwellings close to transit facilities in order to increase job opportunities for all and reduce transportation costs for the poorest? Is housing policy integrated in planning for mixed-use, well-connected communities offering local jobs, or is it undertaken in silos? Does housing policy favor social and ethnic mixing through regulatory frameworks and incentives?
Indicators	• Quantitative housing shortage (number of housing units/number of households) (IDB); • Housing affordability index: Percentage of household income spent on housing (mortgage or rent) by the poorest 20 percent of the population (CRI); • Average housing floor space per person (GPSC); and • Housing deprivation[78] (CRI).

4.2 Education

Subgoal	***To provide quality education for all***
Rationale	Education is essential for human development. Education increases the range and quality of livelihood opportunities, helping to reduce poverty and eradicate hunger. An educated workforce is better able to meet the skills demanded by businesses, and in turn helps local economies to grow and prosper. Equal access to education can help to eliminate gender and ethnic inequalities and empower marginalized and vulnerable groups. SDG 4 aims, by 2030, at eliminating gender disparities in education and ensuring equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations.
Key question(s)	Are educational attainment levels across the population equal regardless of gender, ethnicity, or wealth?
Indicators	• Parity indexes (female/male, rural/urban, bottom/top wealth quintile, and others such as disability status, indigenous peoples, and conflict-affected, as data become available) for all education indicators that can be disaggregated (SDGs); • Adult literacy rate[79] (percentage) by gender, ethnicity, and wealth (IDB, WDI, CPI); • Expected years of schooling by gender, ethnicity, and wealth (adapted from SDGs, CPI); • Net primary enrollment rate (percentage) (SDGs, WDI); • Student/teacher ratio (IDB); and • University seats per 100,000 people (IDB).

[78] Housing deprivation is defined by the City Resilience Index as the percentage of population living in a dwelling considered overcrowded, and exhibiting at least one of the following housing deprivation measures: (1) a leaking roof; or damp walls, floors, or foundations; or rot in window frames or floor; (2) no bath, shower, or indoor flushing toilet; or (3) too dark.

4.3 Poverty Reduction, Hunger Reduction, and Food Security

Subgoal	***To reduce poverty and hunger with the goal of ultimately eliminating them; and to ensure security of food supply and adequate nutrition for all***
Rationale	SDG 1 aims at ending poverty in all its forms everywhere. It aims, by 2030, at eradicating extreme poverty, currently measured as living on less than $1.25 a day, for all people everywhere, and at reducing by at least half the proportion of men, women, and children living in poverty in all its dimensions according to national definitions.Food is an everyday essential requirement for human life. Since most of the urban poor do not produce food, they cannot cope with food price and supply volatility in the same way as rural populations. Unless they can raise their incomes, during supply shortages or times of higher prices they find themselves increasingly vulnerable to the prospect of malnutrition.[80] Food shortages can lead to chronic malnutrition and force individuals to spend significant time and resources to obtain the food necessary to survive. This can affect the ability of the individual or community to meet other basic needs, especially among low-income and disadvantaged groups. Failure of food supplies can result in famine, epidemics, and social unrest as citizens compete for scarce resources.
Key question(s)	Have all men and women, including the poor and the vulnerable, equal rights to economic resources, ownership and control over land and other forms of property, and access to basic services, inheritance, natural resources, appropriate new technology, and financial services, including microfinance? Are there particular groups, communities, or areas within the city where people are unable to afford, or unable to access, sufficient nutritious food? Is food security for the urban poor a city priority? Are there specific policies and actions to ensure urban food security?[81] To what extent are there mechanisms in place to ensure continuity of essential food supplies in an emergency and during times of stress (e.g., if imports from a major source of supply are disrupted/stopped)?
Indicators	• Poverty head count ratio at $1.90 a day (2011 purchasing power parity) (percentage of population) (SDGs, WDI, IDB, CPI); • Proportion of resources allocated by the government directly to poverty reduction programs (SDGs); • Percentage of malnourished children under five as a percentage of all citizens under five (SDGs); and • Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES) (SDGs).

[79] Unless defined otherwise by the country, the indicator measures the percentage of people in the city 15 years and older who can, with understanding, read and write a short, simple statement about their everyday life. The World Bank indicates that "literacy" also encompasses "numeracy," i.e., the ability to make simple arithmetic calculations.
[80] Over 150 million people living in cities and towns, almost all in developing countries, are struggling to maintain a diet sufficient for good health. FAO 2015.
[81] Examples include increasing the supply from farmers in peri-urban areas, improving distribution networks from farms to urban markets, and allocating lands for urban farming.

4.4 Drinking Water and Sanitation

Subgoal	***To ensure access to safe drinking water and adequate sanitation for all***
Rationale	In order to reduce poverty, it is essential to increase access to drinking water and sanitation.[82] Indeed, this access is an essential requirement for human life. Inadequate or unsafe water supply systems and poor sanitation can result in health epidemics and environmental degradation. Time spent obtaining water from a safe source can impact on an individual's ability to work or gain an education.
Key question(s)	Is a safe, reliable, accessible, continuous, sufficient, and affordable potable water supply and sanitation system provided to households across the city?[83] Are there safety procedures in place to ensure stringent quality standards are met at all times? Are there contingency plans for the city that identify how potable water will be distributed in case of a major event or extreme disruption?
Indicators	• Proportion of population using safely managed drinking water services[84] (SDGs, CPI); • Percentage of water samples in a year that comply with national potable water quality standards (IDB, EBRD); • Percentage of population that can be supplied water by alternative methods for 72 hours during disruption (CRI); and • Improved sanitation facilities (percentage of population with access) (SDGs, ISO 37120).

4.5 Basic Physical Infrastructure

Subgoal	***To ensure universal access to basic infrastructure, including affordable energy, solid waste collection service, and public transport***
Rationale	SDG 7 aims, by 2030, to ensure access to affordable, reliable, sustainable, and modern energy for all. Unaffordable or inadequate access to energy (electricity or fuels), solid waste collection services, and public transport can adversely affect health, educational attainment, and livelihood opportunities. Access to adequate, affordable energy, in the form of electricity and/or fuels (gas, oil, wood, peat, etc.), is essential for basic household functions. While the level of energy used by city residents depends on a variety of social and environmental factors, all residents need access to a minimum level of energy supply to meet basic requirements, such as cooking, space heating, and hot water for adequate hygiene.
Key question(s)	Do all households within the city have access to affordable and reliable energy, solid waste collection, and public transport? To what extent are there mechanisms in place for effective alternative (backup) energy supplies for households?

[82] Globally, 884 million people lack access to safe drinking water, and 2.6 billion people—40 percent of the world's population—lack access to basic sanitation. (UNW-DPAC 2012).
[83] According to the World Health Organization (WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation 2012), between 50 and 100 liters of water per person per day are needed to ensure that most basic needs are met and health issues are avoided.
[84] Supplementary metrics: Percentage of population that has access to safe and reliable water (WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation 2012); percentage of city population with sustainable access to an improved water supply (ISO 37120).

Indicators

- **CORE:** Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities (SDG 11);
- Proportion of population living in households with access to basic services (SDGs);
- Percentage of households with a home connection to the sewer system (IDB);
- Electricity provision: Percentage of households with authorized connection to electrical energy[85] (ISO 37120, IDB, EBRD, CRI);
- Average percentage of household income spent onfuel and electricity by the poorest 20 percent of the population[86] (CRI); and
- Energy infrastructure resilience: Number of days that city fuel supplies could maintain essential household functions (through alternative sources)[87] (CRI).

4.6 Health and Well-Being

Subgoal	***To achieve a high standard of health and well-being among the city's population***
Rationale	Public health services help to ensure that city-scale health risks are monitored, epidemics are avoided, and wider health issues are managed. A healthy population is able to enjoy a good quality of life and make a full contribution to the economy. Access to adequate health care and public health services is essential to reduce the occurrence of infectious diseases. Effective welfare services are also important for ensuring people have access to adequate care, accommodation, and nutrition care to support health. Good access to green spaces and recreational facilities, along with walkable streets, also encourages healthy lifestyles.
Key question(s)	Are there particular groups, communities, or areas within the city where the health of the population is generally lower than the national average? To what extent are public health awareness and education programs implemented across the city and extended to disadvantaged or vulnerable groups? How is intersectoral coordination organized to achieve a healthy city?[88]

Indicators

- Number of people covered by health insurance or a public health system per 1,000 population (SDGs);
- Life expectancy at birth by gender (WDI, IDB, CPI, CRI);
- Maternal mortality ratio[89] (SDGs);
- Under-five mortality rate (SDGs, CPI);
- Number of new HIV infections per 1,000 uninfected population, by sex, age, and key populations (SDGs);
- Number of physicians (MD/DO degree) working within the city per 100,000 population (ISO 37120, IDB, CPI, CRI); and
- Hospital beds per 100,000 residents[90] (ISO 37120, IDB, CRI).

[85] Metric guidance: Percentage of households with a safe, legal electricity connection.
[86] This metric examines energy poverty. It focuses on the poorest 20 percent of the population in order to assess the extent to which the overall population struggles to access electricity.
[87] This examines the contingency planning of the city fuel providers and local government. It specifically examines whether they have backup arrangements in place to continue supply in the event of disruption.
[88] Is there a steering committee or coordination council that includes representatives from health, urban planning, housing, sanitation, environment, and transport agencies in order to develop integrated strategies for making the city healthier?
[89] Metric guidance: Maternal mortality rate per 100,000 live births (CRI).
[90] This indicator serves as a general measure of inpatient service availability. Hospital beds include inpatient beds available in public, private, general, and specialized hospitals and rehabilitation centers. In most cases, beds for both acute and chronic care are included. Because the level of inpatient services required for individual countries depends on several factors —such as demographic issues and the burden of disease—there is no global target for the number of hospital beds per country.

4.7 Safety

Subgoal	***To ensure the safety and security of all***
Rationale	SDG 16 aims to promote peaceful and inclusive societies for sustainable development and to provide access to justice for all. High crime rates can lead to long-term social and economic decline by destabilizing communities. They degrade the city's competitive advantage in attracting and retaining residents, talent, and investment. Effective systems to deter crime help to increase a sense of safety among city residents and reduce the costs associated with fighting crime.
Key question(s)	Is the city a safe place to live and do business? What are the policies to prevent and decrease crime prevalence?
Indicators	• **CORE:** Proportion of persons who were victims of physical or sexual harassment, by sex, age, disability status, and place of occurrence, in the previous 12 months[91] (SDG 11); • Proportion of population that feels safe walking alone around the area where they live[92] (SDGs, IDB, CRI); • Proportion of women and girls aged 15 years and older subjected to sexual violence by persons other than an intimate partner in the previous 12 months, by age and place of occurrence (SDGs); and • Homicides per 100,000 population (SDGs, ISO 37120, CPI, CRI).

[91] This indicator may be used to measure the high prevalence in several regions of gender-based violence and violence against children.
[92] This indicator can be based on a sample survey but should include at least 100 households from each district or borough within the city.

4.8 Social Cohesion

Subgoal	***To foster social cohesion and a peaceful and pluralistic society***
Rationale	Communities that are active, appropriately supported by the city government, and well-connected with one another contribute to the bottom-up creation of a city with a strong identity and culture. Conversely, inequalities associated with income, livelihood opportunities, environmental degradation, and access to basic social and physical infrastructure can severely hinder social cohesion across city populations. An inclusive society overrides differences of race, gender, class, generation, and geography and ensures inclusion and equality of opportunity. Development policies, planning and design of urban spaces and infrastructure, and provision of basic services can all help or impede social cohesion. Engaging multiple stakeholders in city decision making helps align different perspectives, leverage knowledge, and ensure that no group or community is marginalized.
Key question(s)	Are there relatively high levels of social cohesion across the city, or is there evidence of civil unrest within or between the city populations? Is the city developing inclusive policies such as equal access to clean and safe places for living, work, and recreation, as well as equal access to basic services,[93] equal access to transportation, respect for diversity, and inclusive decision making? What are the specific actions targeted at marginalized groups? To what extent do local communities and community organizations provide an additional avenue of immediate support for citizens? To what extent is there a cohesive sense of citywide identity and culture in which all citizens feel a sense of belonging?
Indicators	• Women as a percentage of total people elected to city-level office (ISO 37120, CRI); • Ethnic minorities as a percentage of total people elected to city-level office (ISO 37120 Adapted, CRI); and • Voter participation in last municipal election (as a percentage of eligible voters) (ISO 37120, CRI).

[93] These include education, health care, clean water, and sanitation.

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ANNEX A

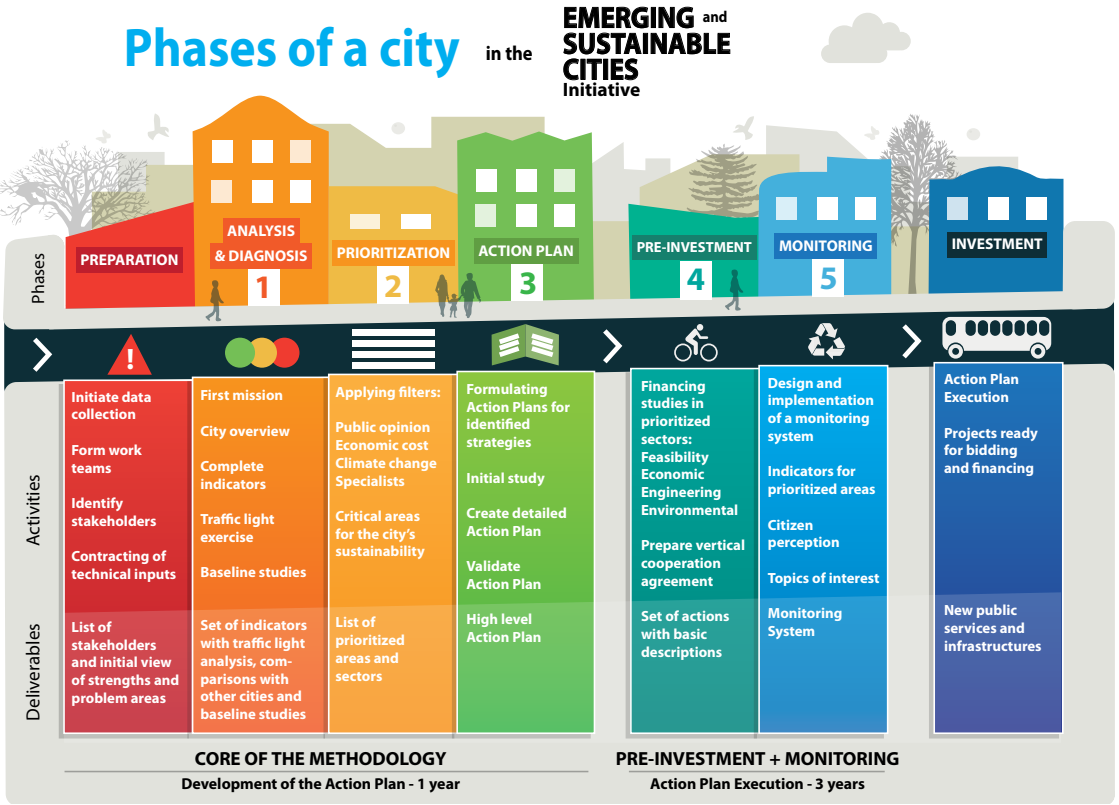
Examples of Other Framework Initiatives

This annex summarizes the overall approach for some of the most widely used and broadly applicable urban sustainability frameworks, including those developed by the Inter-American Development Bank (IDB), Asian Development Bank (ADB), European Bank for Reconstruction and Development (EBRD), UN-Habitat, Global City Indicators Facility, World Council on City Data, ICLEI, National University of Singapore (NUS), and PricewaterhouseCoopers (PwC).

Inter-American Development Bank's Emerging and Sustainable Cities Initiative

In 2010, the Emerging and Sustainable Cities Initiative (ESCI) started as an institutional proposal of IDB. Through a multi-sectoral vision, it aims at supporting the emerging cities of Latin America and the Caribbean in their efforts to improve citizens' quality of life, enhance sustainability for future generations, and increase economic competitiveness as a means of generating decent employment. The ESCI developed a methodology of rapid application and diagnosis to help cities prepare their action plans. It works by identifying strategic interventions that contribute to achieving sustainability targets in the short, medium, and long term. ESCI's methodology is organized in a two-stage, five-phase process, as shown in figure 12.

Figure 12. Phases of an ESCI City



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Asian Development Bank's GrEEEn Solutions for Livable Cities

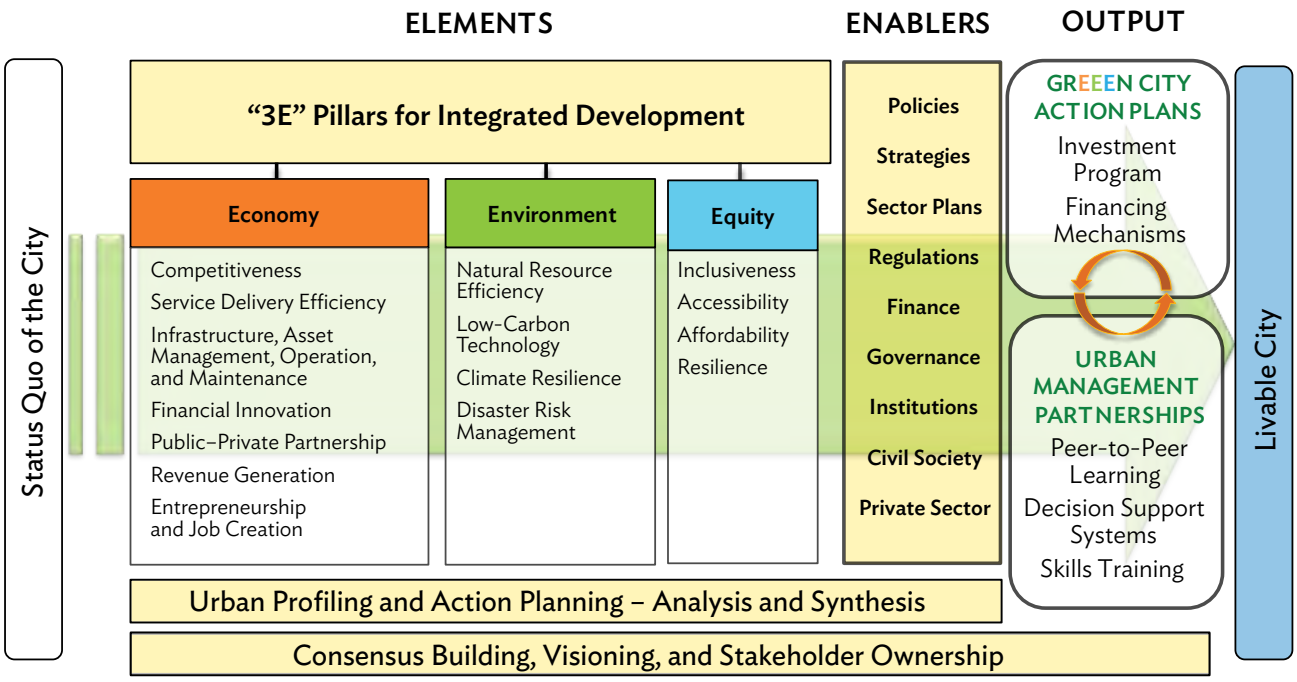
Developed by ADB, the GrEEEn Cities Operational Framework aims at contributing to the achievement of the United Nations SDGs, which offer a triple-bottom-line approach to human well-being through social inclusiveness, environmental protection, and economic competitiveness. The framework is an integrating platform. Through urban profiling and synthesis, it enables a deeper analytical understanding of the economy, the environment, and equity (the "3 Es"—hence the spelling of "GrEEEn"). With the goal of achieving multiple benefits across the "3 Es," the framework analyzes how a single intervention can generate a series of direct and indirect benefits that impact the livability in a city (Sandhu and Singru 2014). The framework is shown in figure 13.

UN-Habitat's City Prosperity Initiative

In order to measure current and future progress of cities on the prosperity path, UN-Habitat has introduced a new tool, the City Prosperity Index (CPI), together with a conceptual matrix, the Wheel of Urban Prosperity. Both are meant to assist decision makers in designing clear policy interventions. The CPI not only provides indexes and measurements relevant to cities, it also enables city authorities, as well as local and national stakeholders, to identify opportunities and potential areas of intervention that will foster greater prosperity.

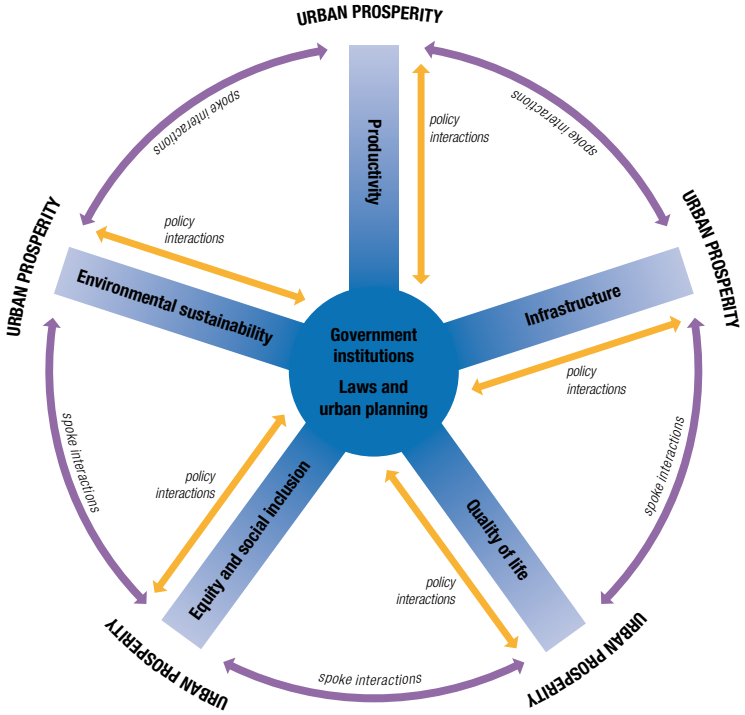
The CPI Wheel of Urban Prosperity conceptualizes prosperity along six dimensions that are summarized in figure 14.

Figure 13. GrEEEn Cities Operational Framework



Source: Sandhu and Singru 2014. © ADB. Reproduced under the document's terms for noncommercial use.

Figure 14. UN-Habitat Wheel of Urban Prosperity



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Global City Indicators Program

The Global City Indicators Program was launched by the World Bank with funding from the government of Japan. Cities can use a database that comes with the program to formulate effective policies for growth and sustainable economic development. In order to help cities assess and monitor their performance, the program has developed a set of standardized, consistent, and comparable indicators over time and across cities. The program is organized into two broad categories: municipal services (which include services typically provided by municipal governments and other entities) and quality of life (which includes contributors essential to overall quality of life even if local governments may have little control over them). The two categories are structured around 18 themes, as shown in table 2.

Table 2. Global City Indicators Program: Categories and Themes

CITY SERVICES	QUALITY OF LIFE
• Education • Energy • Finance • Fire & emergency response • Governance • Health care • Recreation • Safety • Solid waste • Transportation • Water • Wastewater	• Civic engagement • Economy • Environment • Shelter • Social equity • Technology & innovation

Source: Bhada and Hoornweg 2009.

World Council on City Data Open Data Portal

To support cities seeking to improve services and quality of life, the World Council on City Data (WCCD) maintains a data portal of open city data and provides a comprehensive platform for standardized urban metrics. The Open City Data Portal allows cities to explore, track, monitor, and compare member cities on up to 100 indicators of service performance and quality of life. The WCCD is also implementing ISO 37120, the new international standard, and has developed the first ISO 37120 certification system. Certified cities are included in WCCD's Global Cities Registry™ for a one-year period, after which they must be recertified.[94]

ICLEI's Cities for Climate Protection Campaign

In 1993, ICLEI led the establishment of the Cities for Climate Protection Campaign, which aims to facilitate emissions reduction by local governments using a five-stage process. The five stages are (1) measurement; (2) commitment; (3) planning; (4) implementing; and (5) monitoring. ICLEI has developed software tools that support the methods. Presently the campaign engages over 1,000 local government stakeholders who are integrating climate change initiatives with their planning processes (Sustainable Cities International 2012).

National University of Singapore's Framework for Sustainable Growth

In its database of sustainability indicators, NUS's Centre for Sustainable Asian Cities (CSAC) organizes the key issues of sustainable development under 13 major themes: governance, economy, land, water, energy, food, biodiversity, air, waste, transport, culture, people, and climate change. For each studied theme, CSAC has identified quantitative and qualitative urban indicators to assess how well cities are performing in this area. CSAC has also developed an assessment framework encompassing the essential concepts of sustainable development (figure 15).

Figure 15. NUS Framework for Sustainable Growth

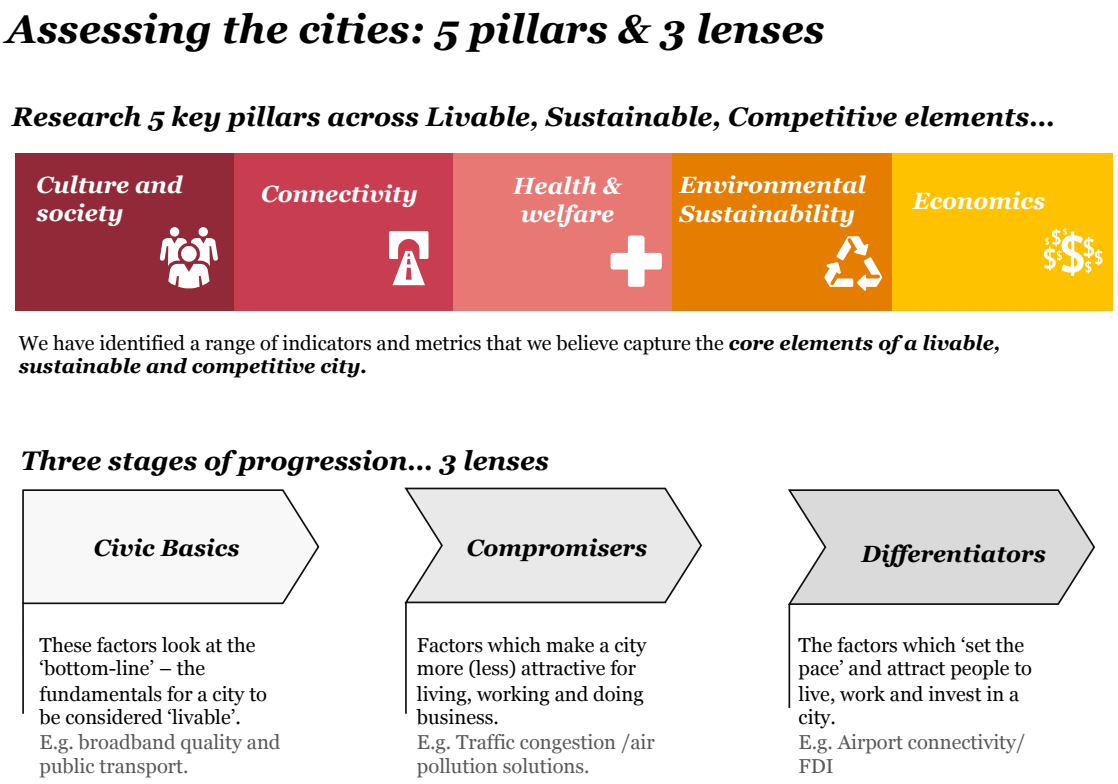
Source: Centre for Sustainable Asian Cities, NUS 2014. © Centre for Sustainable Asian Cities, NUS. Reproduced with permission from Centre for Sustainable Asian Cities, NUS; further permission required for reuse.

[94] WCCD, "Created by Cities, for Cities," http://www.dataforcities.org/wccd/.

PwC's Pillars and Lenses

PwC ranks cities according to 39 different indicators that are seen to represent the distinct stages of urban development. The indicators are grouped into five pillars and (as described in annex B) examined according to three lenses (PwC 2015): one for civic basics, which focuses on areas that create a strong foundation for growth, one for compromisers, which focuses on areas needing improvement, and one for differentiators, which focuses on amenities that distinguish a city. The PwC pillars and lenses are shown in figure 16.

Figure 16. Five Pillars and Three Lenses of the PwC Approach



Source: PwC Singapore 2016. © 2016 PwC. Reproduced with permission from PwC; further permission required for reuse.

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ANNEX B

Moving Up the Urban Sustainability Pathway

A city's sustainability focus likely reflects both its place along the urban development pathway and its level of ambition for the future. To help cities determine what their sustainability focus should include, PricewaterhouseCoopers (PwC 2015) proposes three possible lenses through which they can examine themselves:

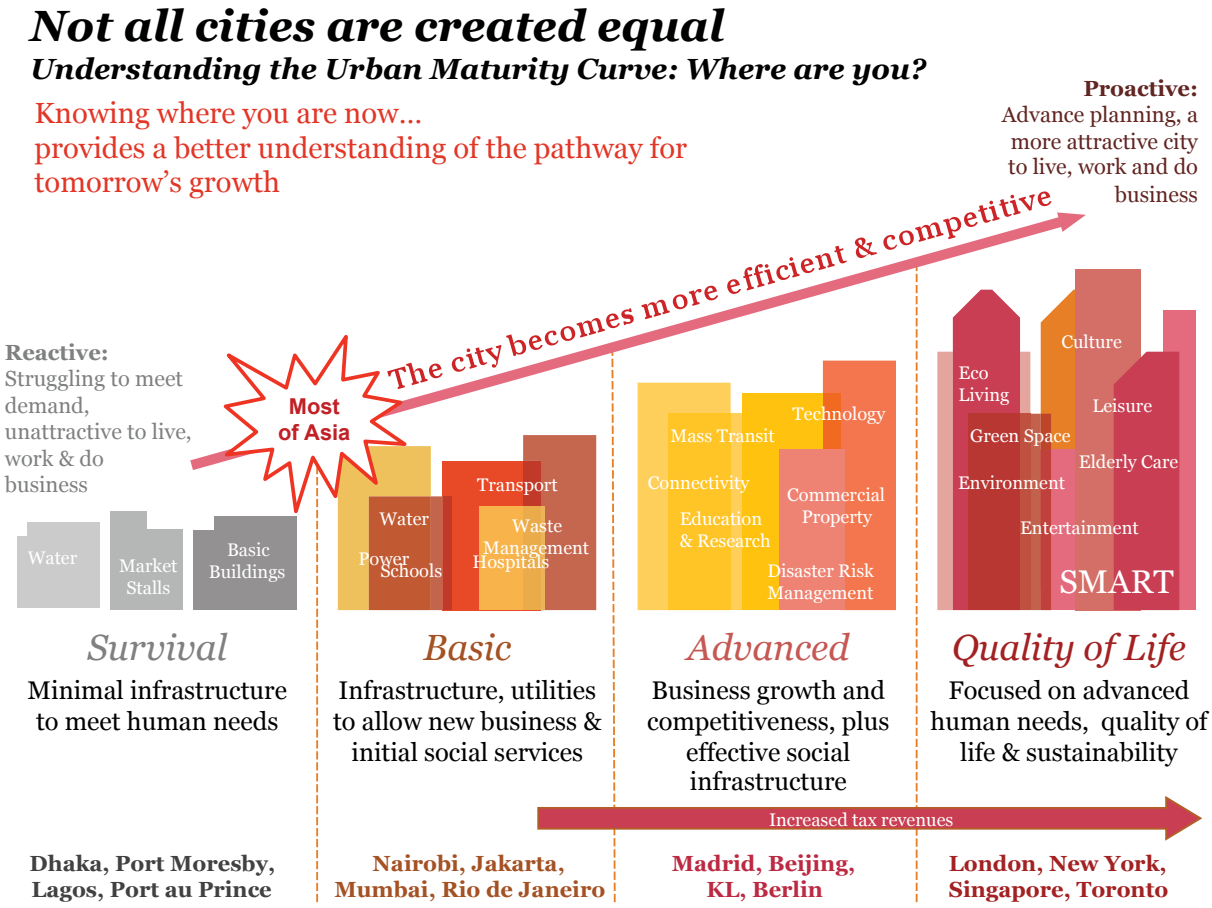
- Basics. At a first level, a city must provide basic services to its citizens and create sufficient infrastructure for its growth—especially health care, housing, air quality, and public transport.
- Differentiators. A city must also identify its differentiating factors or positive attributes, such as a lauded tertiary education system, public spaces and parks, international connectivity infrastructure such as airports, and openness to trade.
- Compromisers. The success of a city can also be altered by compromisers and negative attributes that indicate challenges or risks. These negative attributes include high crime rates, corruption, intolerance and exclusion, or difficulties in doing business, to name a few.

Cities can improve only if they have a true picture of their overall performance. These lenses can help city decision makers select indicators—like those provided in the USF—that serve as meaningful markers for monitoring sustainability performance over time, and that show the city its place along the "urban maturity curve" (figure 17).

World Bank research has shown that when cities improve their economic competitiveness, this is initially because of structural transformation, and later because of efficiency gains and productivity (World Bank Group 2015). At lower income levels, the typical city is a market town that faces the challenge of transformation from a service center to a production center through rapid industrialization. At middle-income levels (between $2,500 and $20,000 per capita), cities are typically production centers striving to increase productivity and take advantage of market opportunities rather than to dramatically transform their industrial mix. At higher income levels, cities generally become centers for the financial and creative industries, with the challenge of transforming themselves again by shifting economic activity to higher-value-added sectors.

Struggling cities should be encouraged by the achievements of cities such as Seoul or Singapore, which went from extreme poverty in the 1960s to high levels of livability, inclusiveness, and per capita income today through integrated, resource-efficient, and sustainable planning. Some of the most thriving global cities of today, including Seoul and Singapore, have traversed all the steps of the sustainability pathway over the last 50 years.

Figure 17. The Urban Maturity Curve



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Seoul's Development Pathway

Through the 1950s, the Republic of Korea was so poor that people had trouble securing even one meal a day.[95] After the Korean War, Korea was one of the world's poorest countries, with per capita income of only $64. In the 1960s, economically the country lagged behind the Democratic Republic of Congo and Mozambique. By the 1980s, it had surpassed Argentina, and by 2010 Korea's GDP per capita had risen to approximately $30,200. Korea today has a higher GDP per capita than Spain and New Zealand and is less than 10 percent behind the European Union, on which it is gaining quickly (Cox 2011). Seoul, Korea's capital, is now a wealthy metropolitan area in a prosperous country.

By using coordinated planning and connecting policies, Korea successfully managed its journey from an incipient to an advanced level of urbanization. To address economic development and urbanization, the government implemented the Five-Year National Economic Development Plans and the National Territory Comprehensive Plans. Under these plans, Korea began a journey of economic progress, with average economic growth of 22.6 percent in the late 1960s.

Korea made progress through the implementation of five major public policies: urban planning and land management; housing development; improved connectivity; the elimination of substandard housing; and the development of housing for low-income groups. Before the complete introduction of an urban planning system, land development programs were set up and the use of land was regulated. The transport system was developed in the following order: first the railway system, then the expressway network in the period of intermediate urbanization, and finally the motorway network and high-speed rail in the advanced period. In the intermediate period, the relocation policies implemented to eliminate slums were not successful. At the beginning of the advanced period, the disappearance of shantytowns was mainly due to market action in residential redevelopment projects.

Throughout Korea's urbanization process, urban planning and land management institutions were adopted to respond to challenges in each urbanization stage, an approach that proved effective. Investments in connective infrastructure contributed to the successful urbanization process by improving the economic efficiency of the national urban system as well as that of individual cities.

Singapore's Transformation: Integrated Planning as an Enabling Factor on the Road to Economic Prosperity

Another striking example of a city that has climbed quite high on the sustainable development ladder is Singapore. Singapore's transformation illustrates how a city can move through all the stages of the pathway for growth, going from mere survival to meeting basics in two decades, and then during the next two decades becoming one of the most prosperous urban economies.

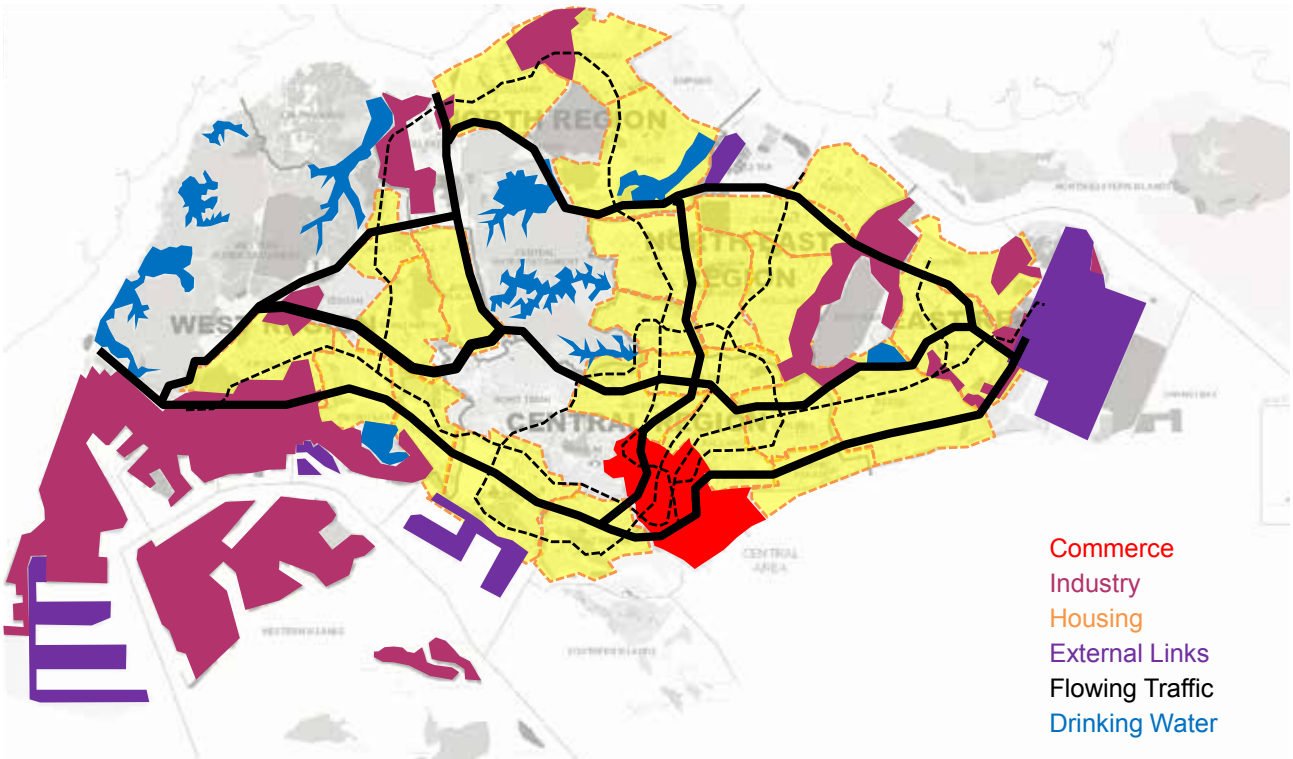
Singapore 50 years ago was a dilapidated city with a high percentage of poverty. Over 1.3 million out of 1.9 million people were living in slums, and Singapore had a GDP per capita of $516 (Liu 2017). It faced a massive squatting problem, along with very limited resources, limited land, little infrastructure, few economic activities and a largely unskilled workforce, and a financial investment shortage. However, the city succeeded in turning its problems into opportunities.

Singapore's economic strategy comprised three components: (1) the government's strategic role, (2) mobilization of its human capital, and (3) continuous development of infrastructure. Early key measures were designed to rise above

[95] This discussion of Korea draws on World Bank (2013).

the development challenges and tackle the most pressing issues in an integrated way. First, commerce was developed along Shenton Way, industry was developed in Jurong, and housing and squatter clearance was prioritized with the establishment of the Housing Development Board. Then, infrastructure was provided to improve the functioning of the city (water, electricity, sewage, etc.), the flow of traffic was enhanced (with roads, buses, MRT [mass rapid transit], etc.), persistent flooding was mitigated with a drainage system, and the island's connectivity was improved with seaports and airports. Particular attention was paid to the environment through pollution control, clean buildings, and the establishment of a garden city committee and a walkways committee. The land shortage was alleviated with land reclamation. Thus, in two generations, from approximately 1960 to 2010, Singapore provided the key infrastructure needed for the city to develop into a prosperous island nation (figure 18).

Figure 18. Key Measures in Singapore



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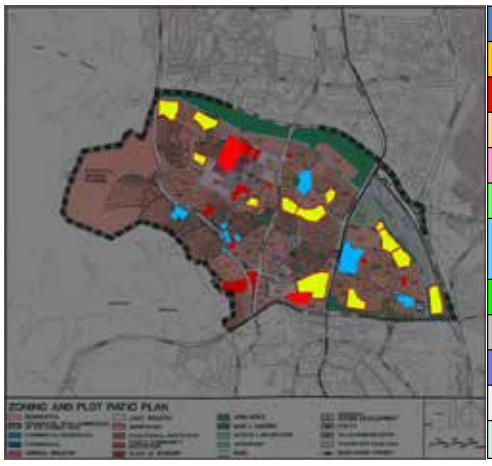
In the following stage of its development, from 1985 until the present, Singapore focused on business growth and competitiveness, effective social infrastructure, and advanced human needs and quality of life. The development targeted both local and global dimensions of sustainability. At the global scale, huge investments gave Singapore some of the best global connectivity infrastructure, including one of the largest-capacity international seaports, one of the best global airports, and an international cruise terminal. In 2014, the annual number of twenty-foot equivalent unit containers (TEUs) handled by its seaport was 21 times greater than it had been 30 years earlier, reaching 33.9 million. The number of passenger arrivals was six times greater, reaching 26.67 million (Liu 2017).

At the domestic scale, the city developed its economy, with modern business centers and industrial estates; its connectivity and accessibility with efficient public transportation systems; its human capital and global appeal with education and art venues; and its inclusiveness with public housing for 82 percent of the population. As a result, GDP per capita reached $56,284 in 2014, 8.3 times greater than it had been 30 years before. Homeownership tripled in 44 years (from 29.4 percent in 1970 to 90 percent in 2014). The length of MRT lines more than doubled in 25 years, and average daily ridership has quadrupled in 20 years, reaching 2.76 million passenger trips in 2014. In spite of a huge increase in wealth and income, the excellent MRT coverage (aiming now at putting 90 percent of the population less than a 10-minute walk from a mass transit station) and urban planning have kept car ownership low, at 109 cars per 1,000 people in 2014. This is only a slight increase over the car usage rate of 80 cars per 1,000 people 30 years before (Liu 2017).

Singapore has achieved a high level of absolute decoupling of economic growth and environmental pressure, cutting its CO2 emissions per capita by two-thirds in 25 years, to 4.32 metric tons in 2011, even as GDP per capita increased seven to eight times over the same period (Liu 2017).

A key success factor has been integrated planning. The city-state has been planned as a polycentric urban region with cascading planning scales: five regions, with 25 new towns, neighborhoods, and precincts. The planning of new towns is based on a decentralization model and on bringing amenities near homes, as exemplified in the example of the Bishan New Town plan and land use table shown in figure 19.

Figure 19. Bishan New Town Plan (left) and Land Use (Right)



Landuse	Area (Ha)	Percentage (%)
Residential	473.5	45
Commercial	83.5	7.9
Educational	72.1	6.9
Institution	21.6	2.1
Parks & Gardens	74.1	7.0
Sports & Recreation	15.8	1.5
Reserve Sites	3.0	0.3
Transportation	140.1	13.3
Industry	84.2	8.0
Utilities & Others	84.2	8.0
Total	**1,052.0**	**100**

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Bishan New Town has achieved a high level of self-sufficiency as a complete 10 km^2 community offering jobs, commercial development, education, green spaces, and amenities: a combined 17 percent of the new town's land area is devoted to institutional land use (shown in red in figure 19), to schools (in yellow), and to commercial use (in blue). The high-density town has been designed to be visually nonoppressive and functionally comprehensive, offering all amenities within a walking distance. This planning approach has led to lower infrastructure costs.

As demonstrated in figure 20, the Housing and Development Board has managed a large percentage of Singapore's building stock with an integrated approach encompassing a range of supporting uses besides housing, including commercial space, industrial facilities, and supporting infrastructure. It has sought to create accessible, livable, people-centered communities in harmony with the environment and ecology.

Figure 20. Housing and Development Board's Integrated Planning Approach

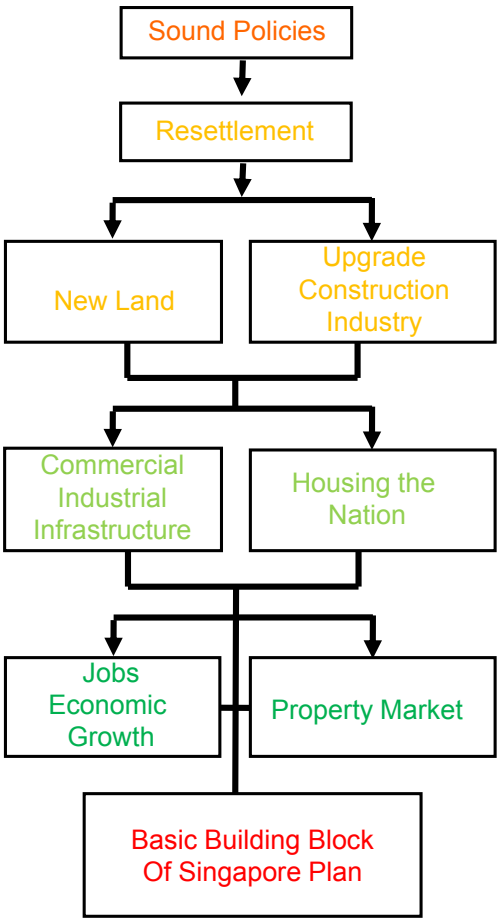

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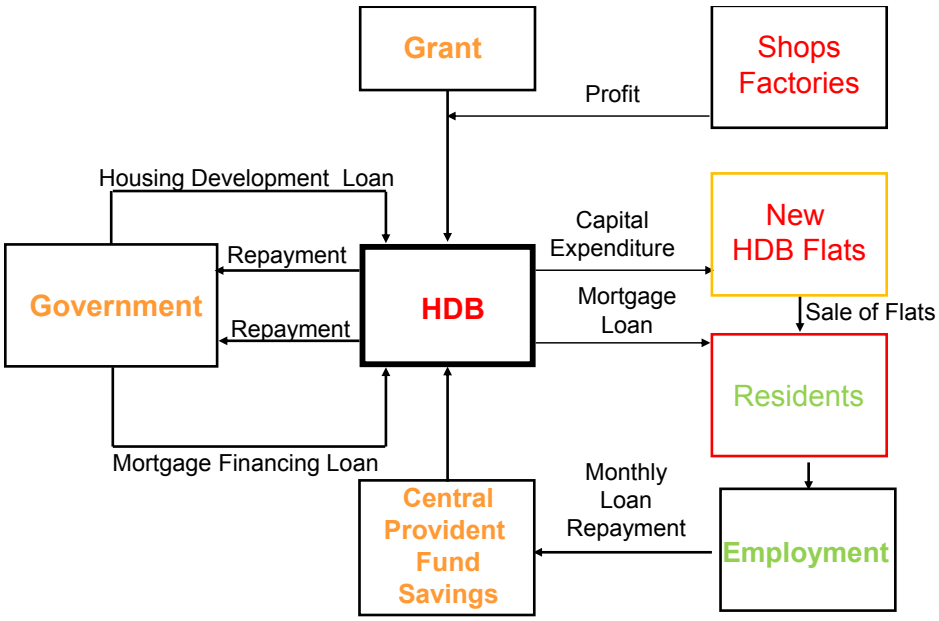
Figure 21. Financing of Housing in New Towns through a Creative Financial System



Source: Liu 2017. Original source from the Housing and Development Board. Modifications by Liu Thai Ker.
Note: HDB stands for Housing and Development Board.

In the new towns, affordable housing has been provided to the majority of the population through a creative financial system that leverages profits from employment, shops, factories, and the sale of flats. This approach takes full advantage of the new towns' mixed-use development, as shown in figure 21.

Singapore's urbanization journey has been of interest to officials from other countries. They have sought to understand how this transformation was done and (more pertinently) what could be replicated in their own cities. Established livability indexes, like the European Union index or the Mercer Index, tend to give the highest rankings to cities with the lowest population density. But Singapore has been ranked as one of the most livable cities in Asia and is of high density. It presents a model of integrated and balanced urban development (CLC and ULI 2013).

Sustainable development has been practiced in Singapore from early in its history. The city's resource constraints have driven it to take a balanced development approach rather than follow the "grow first, clean up later model," in which economic growth comes at the expense of the environment or citizens' quality of life (World Cities Summit Mayors Forum 2013, 6).

Cities of the future are likely to be resource-scarce, have high population densities, and be located mainly in emerging regions like Africa, Asia, and Latin America. Thus, cities like Singapore may offer a more useful model of sustainable development than low-density livable cities (CLC and DRC 2016, 44). Singapore's experience in city development and governance—and its successful absolute decoupling of growth and environmental pressure—could be useful, especially in the development of high-density cities, which are necessary to relieve the pressure future urbanization will place on resources and the environment.

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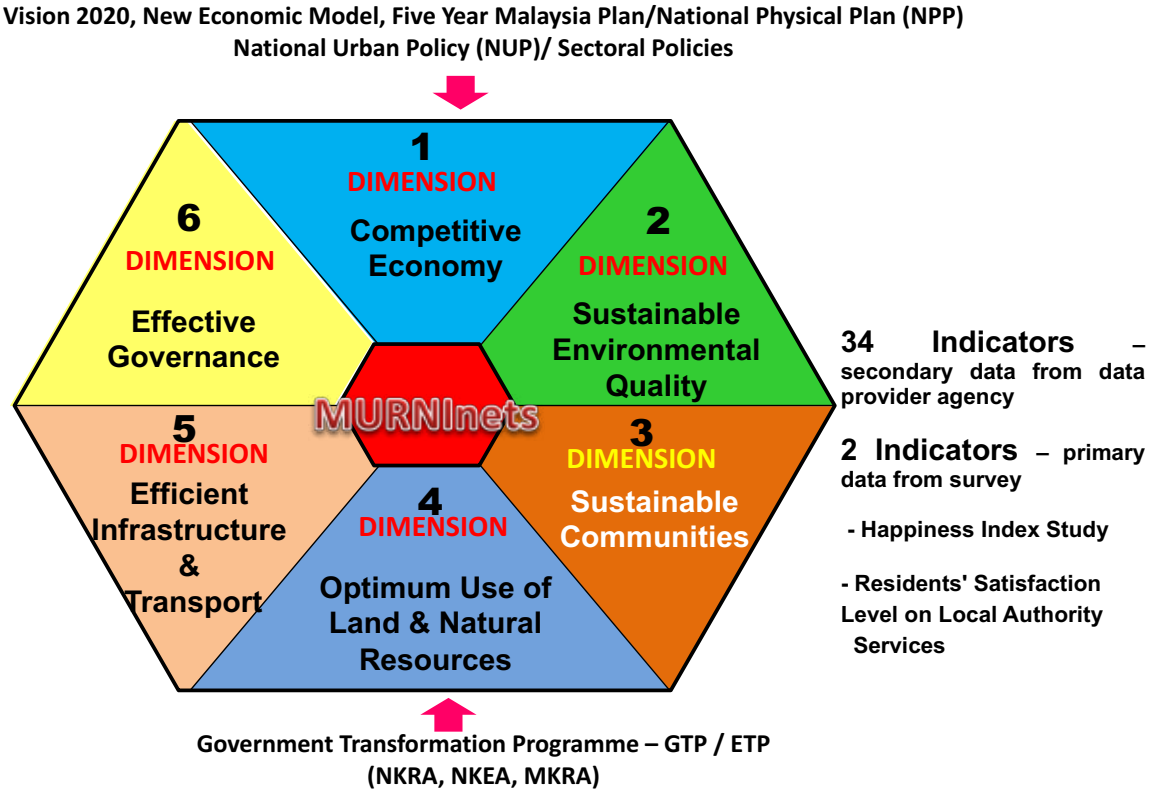
ANNEX C

Malaysian Urban-Rural National Indicators Network for Sustainable Development

The Malaysian Urban-Rural National Indicators Network for Sustainable Development (MURNInets) is a program developed by the Federal Department of Town and Country Planning, Peninsular Malaysia, to assess Malaysian cities' performance and level of sustainability. It was implemented in 2002 and has served as a foundation for measuring city development in Malaysia. The MURNInets framework is shown in figure 22.

Figure 22. MURNInets Framework



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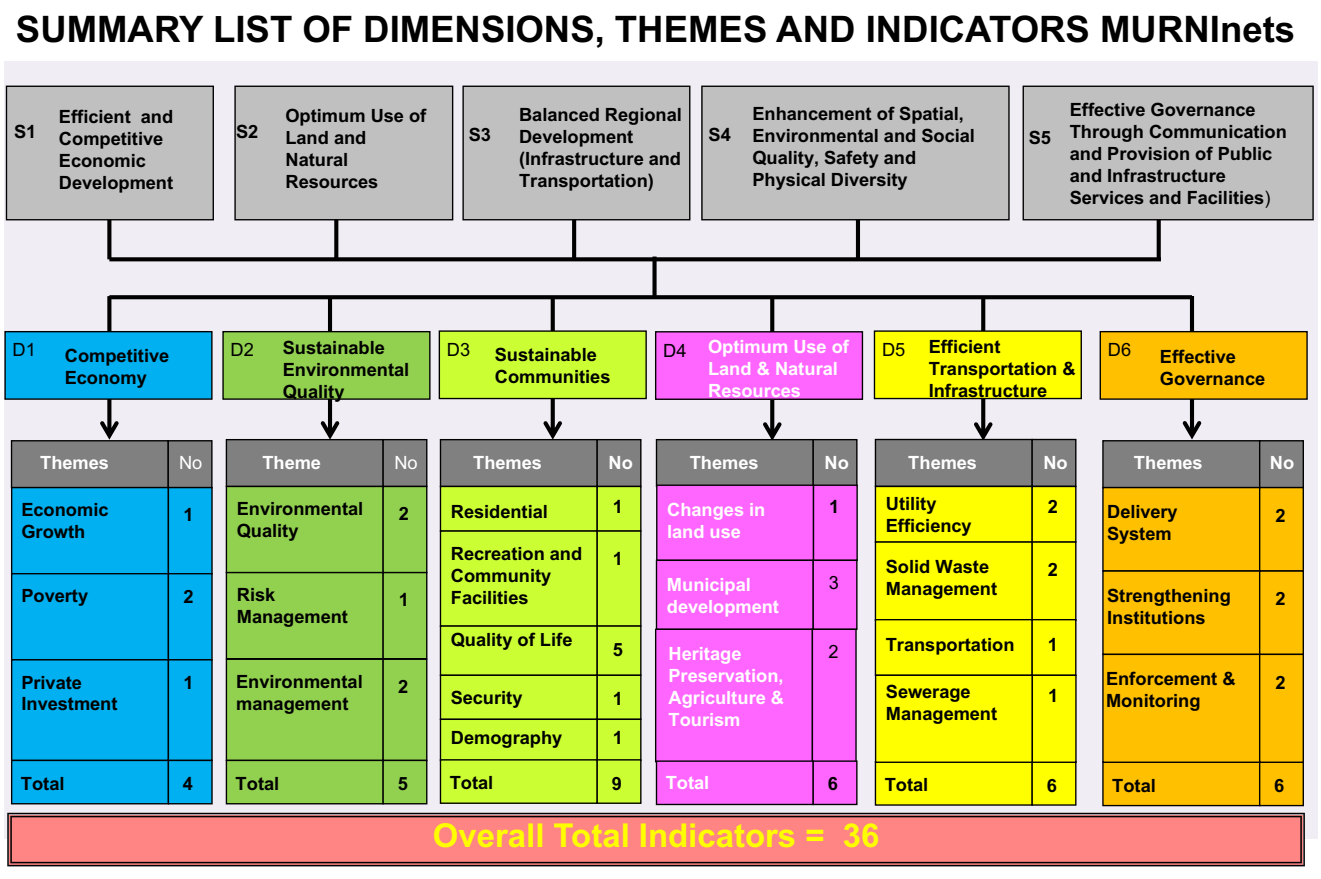
MURNInets pilot projects were launched in six Malaysian cities—namely Georgetown, Johor Bahru, Kuantan, Kuching, Pasir Mas, and Batu Pahat. In 2011, after almost 10 years of implementation, MURNInets was reviewed and a process was introduced that included six dimensions, 21 themes, and 36 indicators. These are summarized in figure 23.

The National Physical Planning Council—the highest authority on physical planning in Malaysia, chaired by the prime minister—is regularly updated on the status of MURNInets implementation as a check on the efforts taken by all local authorities in Malaysia toward attaining sustainable development.

Figure 23. MURNInets Dimensions, Themes, and Indicators



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ANNEX D

Implementing the Vision in New York: OneNYC

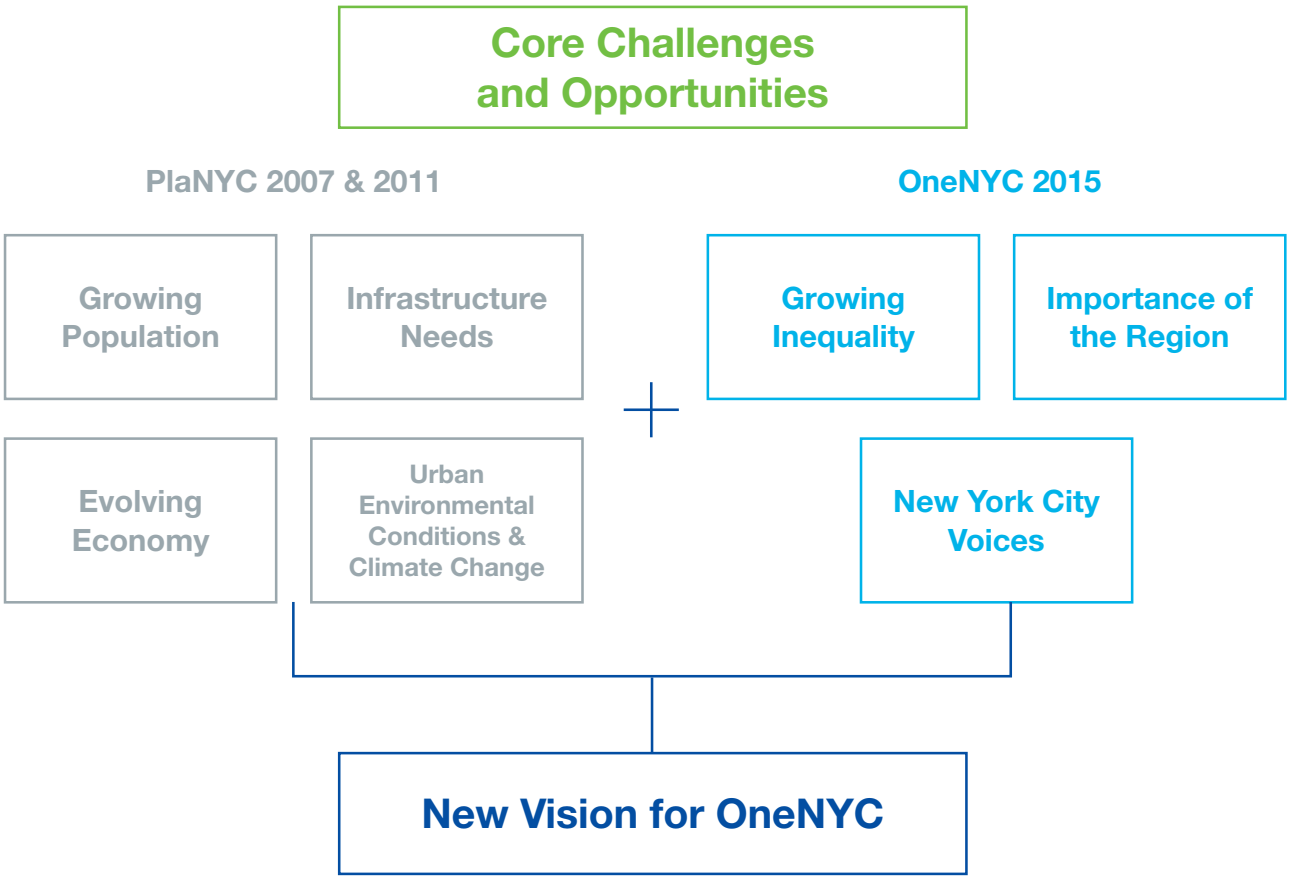
The Vision of One New York: The Plan for a Strong and Just City

In 2007, New York mayor Michael R. Bloomberg released the first PlaNYC, which aimed to respond responsibly to the growing needs of the city's population and infrastructure. Titled "A Greener, Greater New York," it included the city's initial sustainability strategy, and it has become the model for other major global cities. PlaNYC identified measures to improve the city's aging infrastructure, support parks, improve the quality of life and health of New Yorkers, and commit for the first time to reducing greenhouse gas emissions (City of New York 2015).

In 2013, after Hurricane Sandy, the city unveiled PlaNYC: A Stronger and More Resilient City, which documented lessons learned from Sandy, developed a reconstruction strategy, and developed recommendations to adapt the city to projected impacts of climate change, including sea-level rise and extreme weather events (City of New York 2015).

The PlaNYC reports have focused on pressing issues of growth, sustainability, and resilience. All of these objectives remain at the core of the current plan, called OneNYC, which was published in 2015. But there are three significant differences in the approach taken with this plan, as illustrated in figure 24, it focuses on inequality, has a regional perspective, and seeks the direct involvement of New Yorkers in defining the plan's goals and initiatives (City of New York 2015).

Figure 24. Core Challenges and Opportunities Addressed in OneNYC



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New York's vision for its fifth century is therefore organized around the principles of growth, equity, sustainability, and resilience. At the vision stage itself, the principles are associated with ambitious and measurable goals that will then be implemented with sustained investments and monitored actions.

"Vision 1: Our Growing, Thriving City"

With vision 1, New York aims at continuing to be the most dynamic urban economy in the world, and a thriving place for families and businesses. This vision seeks to

- Implement an ambitious program for affordable housing;
- Support a first-class business sector of the 21st century;
- Foster employment growth;
- Build an inclusive workforce with training for high-growth industries and programs providing skills to the most difficult to employ;
- Support the burgeoning economy of innovation and develop high-speed wireless networks and transportation infrastructure; and
- As a regional hub, work closely with neighbors on transportation, housing, and employment issues.

"Vision 2: Our Just and Equitable City"

With vision 2, New York City aims at having an inclusive economy that offers jobs and opportunities so that all can live in dignity and security. This vision seeks to

- Take 800,000 New Yorkers out of poverty or near-poverty by 2025, raise the minimum wage, and launch initiatives for education and job growth;
- Reduce premature mortality by 25 percent, and ensure access for all to physical and mental health services and household risk control;
- Expand Family Justice Centers to help victims of family violence; and
- Promote the citywide integration of government services, information, and community data.

"Vision 3: Our Sustainable City"

Vision 3 aims at making New York City the world's most sustainable city and a world leader in the fight against climate change. This vision seeks to

- Minimize New York's environmental footprint;
- Reduce greenhouse gas emissions: The city is pursuing its goal of reducing greenhouse gas emissions by 80 percent by 2050 ("80 x 50")—the largest city in the world to take on this commitment—and expands its initial focus on buildings to include energy supply, transport, and solid waste as part of a comprehensive action plan to achieve the goal;
- Have the cleanest air and water of any big city;
- Commit to achieving the goal of zero waste in landfills by 2030 (keeping organic matter out of the landfill will also reduce greenhouse gas emissions);
- Make major investments to remediate contaminated lands; and
- Ensure that underserved New Yorkers have more access to parks.

"Vision 4: Our Resilient City"

Vision 4 aims at ensuring New York's neighborhoods, economy, and public services are ready to resist and emerge stronger from the impacts of climate change and other 21st-century threats. This vision seeks to:

- Ensure the ability to respond to adverse events such as Hurricane Sandy;
- Provide basic services and services to all residents, and become stronger as a community—with the goal of eliminating by 2050 long-term displacement of homes and jobs after shock events;
- Improve public and private buildings to be more energy efficient and resilient to the impacts of climate change;
- Adapt infrastructure such as transportation, telecommunications, water, and energy to withstand severe weather events;
- Strengthen coastal defenses against floods and sea-level rise; and
- Strengthen homes, businesses, community organizations, and public services to reduce the impacts of disruptive events and promote faster recovery.

Implementing and Monitoring the Plan with Goals and Indicators

The plan delivery is monitored through a comprehensive framework of indicators organized according to a cascading structure: visions/goals/indicators. As shown in figures 25–28, the monitoring system gives previous data, latest data, and target for each indicator, and uses a traffic light system to show whether performance is improving or stable (green), is declining by less than 10 percent (yellow), or is declining by more than 10 percent or above tolerance (red).

The vision level indicators and goals for each of the four visions are presented in figure 25.

Vision 1 has six goals, each of which is monitored in detail using a series of indicators:

- **Goal 1. Expansion of the Industry** aims at ensuring that New York City will have the space and the assets to become a world economic leader and develop high-quality jobs in various sectors.
- **Goal 2. Workforce Development** aims at developing a workforce with the skills to participate in the 21st-century economy.
- **Goal 3. Housing Supply and Affordability** aims at ensuring that New Yorkers have access to affordable, high-quality housing coupled with robust infrastructure and community-based services.
- **Goal 4. Culture** aims at ensuring that New Yorkers have easy access to cultural resources and activities.
- **Goal 5. Transportation** aims at ensuring a reliable, safe, sustainable, and accessible transportation system that meets the needs of all New Yorkers and supports the city's growing economy.
- **Goal 6. Broadband** aims at ensuring for every resident and every business access to affordable, reliable, and high-speed broadband service anywhere by 2025.

Figure 25. Vision 1: Growth

Goal	Indicator	Previous Data	Latest Data	Target
Vision-level indicator	**Population**	8,516,502 (2015)[1]	8,537,673 (2016)	9 million (2040)
	Median household income	$52,996 (2014)	$55,752 (2015)	Increase
	Gross City Product (GCP)	$653.2 billion (2014)[6] 3.4% GCP growth compared to 2.4% GNP growth	$662.5 billion (2015) 1.4% GCP growth compared to 2.5% GNP growth	Outperform national economy (percentage growth rate of gross national product) annually
	Total number of jobs	4.296 million (2016)	4.396 million (2017)	4.896 million (2040)
	Number of jobs accessible to the average New Yorker within 45 minutes by transit	1.5 million (2015)	Data Not Available	1.8 million (2040)
	Share of New Yorkers that can access at least 200,000 jobs within 45 minutes by transit	88% (2015)	Data Not Available	90% (2040)
	Number of new and preserved affordable housing units financed under Housing New York (cumulative)	21,044 (2015) 40,204 (cumulative)	21,970 (2016) 62,506 (cumulative)	120,000 (2024)
	Number of new affordable and market rate residential units (cumulative 10 year total, by permit)[4]	57,386 (2015) 80,287 (cumulative)	15,011 (2016) 95,298 (cumulative)	240,000 (2015-2024)

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Vision 2 has five goals, each of which is monitored in detail by a series of indicators:

- **Goal 1. Early Childhood** aims at ensuring that every child in New York will be nurtured and protected and will thrive.
- **Goal 2. Healthy Neighborhoods, Active Living** aims at ensuring that New Yorkers of all ages will live, work, learn, and play in neighborhoods that promote an active and healthy lifestyle.
- **Goal 3. Access to Health Care** aims at giving access to physical and mental health services to all New Yorkers.
- **Goal 4. Criminal Justice Reform** aims at keeping New York the safest among the largest US cities with the lowest incarceration rate, and a fair and efficient criminal justice system.
- **Goal 5. Vision Zero** targets zero road accidents in the streets of New York.

Figure 26. Vision 2: Equity

Goal	Indicator	Previous Data	Latest Data	Target
Vision-level indicator	**Number of New Yorkers lifted out of poverty or near poverty based on simulating wage changes to 2013 data and tracking certain anti-poverty initiatives**	~101,000 based on prior wage increases through 2015	~281,000 based on prior wage increases through 2017	800,000 people lifted out of poverty or near poverty by 2025
	Premature mortality rate[1]	186.00 deaths per 100,000 (2014)	184.5 deaths per 100,000 (2015)	142.6 deaths per 100,000 (25% decrease) (2040)
	Premature mortality rate disparity - Black vs. White	1.48 x (2014)	1.51 x (2015)	1.27 x (2040)
	Median household income	$52,996 (2014)	$55,752 (2015)	Increase

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Vision 3 has six objectives, each of which is monitored in detail by a series of indicators:

- **Goal 1. 80 x 50** targets reducing New York's greenhouse gas emissions by 80 percent by 2050 compared to 2005.
- **Goal 2: Zero Waste** targets sending zero waste to landfills by 2030.
- **Goal 3. Air Quality** targets having the best air quality among all cities in the United States by 2030.
- **Target 4. Brownfields** targets cleaning up contaminated lands (to deal with disproportionately high exposures in low-income communities) and converting land to safe use.
- **Goal 5. Water Management** comprises mitigating flooding in neighborhoods and providing high-quality water services.
- **Goal 6. Green Spaces** seeks to ensure that all New Yorkers will benefit from open spaces that are useful, accessible, and beautiful.

Figure 27. Vision 3: Sustainability

Goal	Indicator	Previous Data	Latest Data	Target
Vision-level indicator	**Greenhouse gas emissions reductions relative to 2005[1]**	12% (2014)	14% (2015)	80% reduction by 2050 relative to 2005
	Volume of DSNY-collected refuse (excluding material collected for reuse/recycling) relative to 2005 baseline of ~3.6M tons[2]	3,176,900 tons (11.5% reduction) (2015)	3,196,200 tons (10.9% reduction) (2016)	90% reduction by 2030 from 2005 baseline (358,860 tons)
	Reduce risk of stormwater flooding in most affected communites as measured by backlog of catch basin repairs	0.44% (2015)	0.65% (2016)	Maintain < 1%

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Vision 4 has four objectives, each of which is monitored in detail by a series of indicators:

- **Goal 1. Neighborhoods** aims at ensuring neighborhood safety by building community, social, and economic resilience.
- **Goal 2. Buildings** aims at improving buildings against climate change.
- **Goal 3. Infrastructure** ensures that infrastructure systems in the region will adapt to maintain ongoing services.
- **Goal 4. Coastal Defense** will strengthen New York's coastal defenses against floods and rising sea levels.

Figure 28. Vision 4: Resiliency

Goal	Indicator	Previous Data	Latest Data	Target
Vision-level indicators	**Eliminate disaster-related long-term displacement of New Yorkers from homes by 2050**	Data Not Available	Data Not Available	Eliminate (2050)
	Reduce the Social Vulnerability Index for neighborhoods across the city	4 (2010)	Data Not Available	Reduce
	Reduce average annual economic losses resulting from climate related events	Data Not Available	Data Not Available	Reduce

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ANNEX E

Measuring Fiscal Sustainability with Credit Ratings

Fiscal sustainability refers to a city's ability to sustain an adequate level of ongoing administrative and urban services using its total recurrent revenues, while also investing in infrastructure improvements to meet the foreseeable growth in demand for city services. For fiscal sustainability, as for other components of sustainability, the first steps in the process of defining and improving on current performance are understanding, measuring, and tracking. The most useful tool for measuring a city's fiscal sustainability is a credit rating. It provides a forward-looking, standardized, external assessment of financial conditions that can be consistently tracked over time and benchmarked against similar cities.

Making use of market-based financing mechanisms depends on convincing the financial community that it can earn an acceptable profit by participating in a city's infrastructure-financing transaction. This persuasion is possible only if the city is shown to be fiscally sustainable in the long term. Therefore, for a city to mobilize long-term financing for infrastructure from market-based sources, it must achieve and demonstrate its fiscal sustainability.

Fiscal sustainability is also referred to as creditworthiness. Creditworthiness means the ability and willingness of a potential borrower to repay its debt in full and on schedule, but it can be generalized to mean the borrower's ability and willingness to meet all of its financial obligations. In order for a city to finance the infrastructure it needs for implementing its action plan, it must offer the financial community a creditworthy investment opportunity. Creditworthiness can be objectively measured by credit ratings that are based on standardized analysis performed by credit rating agencies. Credit ratings are therefore a good way for cities to measure their financial sustainability and benchmark their performance.

Creditworthiness is a relative term. A city can be "more creditworthy" or "less creditworthy" compared to other organizations. That is why credit ratings are presented as a scale: from AAA (the lowest risk of financial default) through C (default is imminent or inevitable) to D (in default). A city with a credit rating of BBB- or better is said to be "investment grade," while one with a lower rating is said to be a "speculative" investment (table 3).

Table 3. The ABCs of Rating Scales by Standard & Poor's Financial Services (S&P)

Investment Grade	**AAA**	Extremely strong capacity to meet financial commitments. Highest rating
	AA	Very strong capacity to meet financial commitments
	A	Strong capacity to meet financial commitments, but somewhat susceptible to adverse economic conditions and changes in circumstances
	BBB	Adequate capacity to meet financial commitments, but more subject to adverse economic conditions
	BBB-	Considered lowest investment-grade by market participants
Speculative Grade	**BB+**	Considered highest speculative-grade by market participants
	BB	Less vulnerable in the near-term but faces major ongoing uncertainties to adverse business, financial and economic conditions
	B	More vulnerable to adverse business, financial and economic conditions but currently has the capacity to meet financial commitments
	CCC	Currently vulnerable and dependent on favorable business, financial and economic conditions to meet financial commitments
	CC	Highly vulnerable; default has not yet occurred, but is expected to be a virtual certainty
	C	Currently highly vulnerable to non-payment, and ultimate recovery is expected to be lower than that of higher rated obligations
	D	Payment default on a financial commitment or breach of an imputed promise; also used when a bankruptcy petition has been filed or similar action taken

Ratings from 'AA' to 'CCC' may be modified by the addition of a plus (+) or minus (-) sign to show relative standing within the major rating categories.

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But what kinds of organizations is a city's creditworthiness being compared to? That depends on whether the credit ratings are on a national or international rating scale.[96] City governments or urban service providers that borrow funds in their domestic local currency markets can be rated on their national rating scale, where the comparator with the lowest risk of default is the AAA national government.[97] City governments and urban service providers that achieve national scale ratings of BBB- or better are considered investment-grade risks for local currency investors and lenders. Each credit rating agency has its own methodology for assessing the risk that a city or urban service provider will default on its debt. However, the essential factors analyzed by these methodologies are virtually the same and include the following:

- The institutional framework surrounding the city, including centralized/decentralized governance, degree of fiscal autonomy, formal responsibilities of the city, legally mandated annual expenditures, and the characteristics of any funding provided from the national government;
- The economic outlook for the city, including trends in the economic base, the local revenue base, employment conditions, local income and wealth, demographics, and the per capita tax/fee burden compared to other similar cities and the national average;
- The city's debts and other liabilities, including current debt (long or short term, fixed or variable interest rate, to be paid in local currency or foreign currency), the debt service burden, the needs for future debt financing, other liabilities, and contingent liabilities and how they are funded;
- The characteristics of the city's finances, including trends in total revenues (their volatility, diversity, and predictability), total expenditure, the balance (surplus or deficit) between recurrent operating revenues and recurrent operating expenditures, reserves, and liquidity; and
- The management and administration of the city, including institutionalized financial policies and procedures; management of the budget; accounting and financial reporting; independent external audits; effects of politics, labor issues, or citizen initiatives; and the degree of revenue and expenditure flexibility.

Obtaining a national scale investment-grade credit rating should be an aspiration of all city governments and urban service providers that are pursuing sustainability.[98] However, it is not necessary for a city to be publicly rated immediately. A city can start with a "private" or "shadow" credit rating that is provided only to the city administration as a means of identifying where the city stands on the rating scale so that improvement measures can be carried out before a fully public rating is conducted and released. Creditworthiness is not limited to local governments—it extends to their utility companies. In Kenya, the Water Services Regulatory Board calculated and published utility shadow credit ratings for 43 water service providers in 2011 and found only 13 providers to have investment-grade ratings.

A national scale investment-grade credit rating is a good way for a city to demonstrate its fiscal sustainability and creditworthiness to the domestic financial community. However, achieving and

[96] Multilateral development banks, sovereign governments, and large corporations are rated on the international rating scale when they want to borrow hard currency funds (U.S. dollars, euros, yen) in the international markets. Here the comparators are the global AAA organizations that demonstrate the lowest risk of default (for example, the World Bank, the government of Switzerland, and Microsoft).
[97] Note that national governments that do not issue their own unique currency (e.g., national governments in the euro area or the CFA zone) are not always considered AAA and may even be rated as speculative in the rating scale associated with their currency (e.g., Greece).
[98] Such a credit rating could be anything from AAA to BBB- on a national scale—for example, a city's credit rating could be an AA(mx) in Mexico or an A+(za) in South Africa.

maintaining an investment-grade rating requires an enduring commitment to sound financial management by the city or urban service provider and a supportive and enabling fiscal environment. It entails prudent management of the operating budget (revenue and expenditure), the capital budget (investment in infrastructure), liquidity (cash flow), and debt. It also entails a fiscal framework that assigns adequate revenue sources; allows adjustment of tax, tariff, and fee rates when necessary; and provides formula-based revenue transfers that are predictable and timely.

In addition to providing the means for a city or urban service provider to demonstrate its creditworthiness to financial institutions, credit ratings offer other advantages. The rating report that accompanies the letter grade spells out the financial strengths and weaknesses of the authority in some detail, and can be used to guide a city's efforts to improve its financial management. When ratings are made public, they are a simple and transparent means of communicating a city's financial condition to key stakeholders and the community at large. They can also be used by national governments to monitor the financial health of a city with complete objectivity.[99]

There are several things that a city can do to achieve and demonstrate fiscal sustainability and thereby improve its credit rating (World Bank 2018):

1. Increase the city' own-source revenue;
2. Put the city's intergovernmental transfer revenues on a sound basis; and
3. Maintain an operating margin surplus of recurrent revenues over expenditures.

1. Increasing own source revenue. Many cities have found that through successful reforms and improvements in various stages of the revenue collection process (registration, assessment, billing, collection, and monitoring), they can increase their own-source revenue, often quite substantially. The best course of action is to increase the revenue yielded under existing tax, tariff, and fee rates before proposing an increase in rates. Improvement of revenue collection practices is an essential step in justifying any proposed increase in rates.[100]

After improving own-source revenue collection as much as possible and raising tax, tariff, and fee rates on existing revenue sources as far as possible, a city may still need to seek additional sources of revenue in order to achieve fiscal sustainability. Introducing a new tax, user charge, or fee at the local level is usually a difficult and politically unpopular measure. It is not easy to do and may require convincing city residents of its necessity and persuading higher levels of government to approve its use.

In addition to the foregoing steps, a city may be able to marginally increase revenues by actively managing its cash balances so that they provide interest income, but prudent cash management requires investing in ways that maintain liquidity (so that funds are available when required) and security (so that funds are not lost in bad investments).

[99] It is also important to note that credit ratings can be based on either (1) the risk of default by a city or urban service provider on any of its financial obligations, referred to as an "institutional" or "general obligation" credit rating, or (2) the risk of default on a specific financial obligation of the organization, such as a bond, loan, or PPP agreement, which is referred to as a "bond rating" (although it can apply to any specific financial obligation). While a city's bond rating has its foundation in the city's general obligation rating, the specific bond, loan, or PPP being rated can be structured in a way that reduces the risk of default. As a result, it is even possible for a city with a general obligation credit rating slightly below BBB- to offer the financial community an attractive long-term investment grade "structured obligation." This broadens the universe of cities that can access long-term financing through private and mixed mechanisms, but only to the extent that the cities can afford to pay for all of the structural "credit enhancements" that are built into the financing.

[100] If a city has the ability to raise tax, tariff, and/or fee rates, and revenue collection at current rates has been improved as much as possible, then it should try to set rates at levels that can generate sufficient revenue to cover the cost of mandated services.

2. Putting intergovernmental transfer revenues on a sound basis. A city needs to be able to accurately forecast the amount and timing of its revenue from year to year. If a city faces unpredictable, unstable, and/or delayed transfers from higher levels of government, then accurate revenue forecasting is unreliable, and it will need to work with the higher levels of government to improve the predictability and timeliness of transfers, especially those linked to the city government's mandated services.[101]

Even when the sources of funding for intergovernmental transfers are stable, the transfers will not be predictable unless an agreed formula for the allocation of transfers is consistently applied. If transfers are based on what a higher level of government can "afford at the moment," then agreement needs to be reached on a "minimum" allocation to be provided every year. If bureaucracy at a higher level of government typically delays transfers (intentionally or unintentionally), then the transfer mechanism and process will need to be simplified and made more transparent.

3. Maintaining an operating margin surplus. A city's operating margin is its operating revenue (all revenue not specifically designated to fund the capital budget) minus its operating expenditures (all expenditures not included in the capital budget). To maintain an operating margin surplus, a city needs to keep operating expenditures below the level of annual recurrent operating revenues. Recurrent operating revenues are those that a city government can always expect to collect every year; that is to say, they are very predictable revenues (either own-source or transfers). In order to keep operating expenditures below the level of annual recurrent operating revenues, a city will need to

- Establish a written policy that limits budgeted expenditures to less than the level of the recurrent revenue estimate for the year;
- Prepare conservative estimates of recurrent revenues for at least three years ahead;
- Prepare expenditure estimates for at least three years ahead that anticipate likely increases in expenditures for each budget line item;
- Compare future-year recurrent revenue estimates with corresponding expenditure estimates to identify potential problems in maintaining the "budget limit; and
- Prepare and adopt annual expenditure budgets that comply with the "budget limit" policy. A city should assess all options for increasing its operating margin to determine which ones are legally, technically, and politically feasible. Possible options include increasing recurrent operating revenue (own-source and transfers); reducing personnel expenditures; reducing the cost of goods and services used; and/or reducing energy and fuel expenditures.[102]

To further reduce expenditures, the city government needs to think strategically and consider the medium and long term as well as its immediate situation. Repairing old equipment and facilities can become more and more expensive over time. At some point, it is more cost-effective to replace equipment or facilities than to continue to repair them.

Whatever methods are chosen, maintaining an operating margin surplus provides the essential foundation for a city's financial sustainability. Problems in maintaining a positive operating margin will jeopardize a city's fiscal sustainability, and the underlying problems need to be addressed as soon as possible.

Box 16 presents criteria used by a rating agency for assigning ratings to local and regional governments.

[101] If the national government's own source of revenue for funding transfers is unpredictable, then it will be necessary to seek a more stable source of funding. While every country is different, it should be possible to identify several national government revenue sources that do not fluctuate very much from year to year. A relatively small but consistent percentage of large and stable streams of national government revenue should be automatically set aside to fund intergovernmental transfers every year.
[102] It may be possible for a city to reduce expenditures through cost-saving measures such as outsourcing, introducing better technology, improving security over equipment and materials, using less overtime, standardization of vehicles and computers, etc.

Box 16. Rating Criteria for an International Local or Regional Government

The international credit rating agency Fitch considers a number of factors for rating entities or debt instruments in different jurisdictions outside of the United States, though not all factors are applicable in every case. Overall, a local or regional government (LRG) that performs consistently and shows its ability to absorb shocks will receive a higher rating than one that does not. The rating process takes into account the influence that the different factors exert on one another. For example, "the socio-economic profile influences the tax base and expenditure pressures. The fiscal results affect the LRG's need to borrow or retire debt. Management has an impact on revenue, expenditure and risk appetite." The main rating criteria that Fitch considers are listed below.

Institutional framework. The assessment of the institutional framework looks at constitutional and statutory regulation, oversight by higher levels of government, equalization funding, and transparency, among other factors.

Additional factors. Other relevant factors, such as the LRG's economy, debt and other long-term liabilities, finances and fiscal performance, and management/administration, help sharpen the analysis of the LRG once the institutional framework has been assessed.

Intrinsic credit profile. This is the result of the outcome of the rating factors before any further criteria (e.g., ratings floor or sovereign ratings cap) are applied.

Debt securities. The nature of the specific debt security and its relationship to the issuer's general credit quality will influence the security's rating. Given that "in most instances, the debt security represents a senior and unsecured claim on the sub-national," the security's rating is "typically the same as the relevant Issuer Default Rating."

Ratings above the sovereign. In determining an LRG rating, the sovereign rating is typically considered a cap. This approach reflects "the high degree of control and potential intervention by the central government." An exception to this approach is made for LRGs "that enjoy a high degree of autonomy on taxation, freedom to access financial resources, and institutional recognition."

Source: Fitch Research 2015.

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ANNEX F

Moving from Diagnosis to Priority Actions in Addis Ababa

Addis Ababa is the largest city in Ethiopia and one of Africa's fastest-growing cities. It plays an important role for the development of the country and for the economic prosperity of the region. Addis Ababa's efforts to promote greater sustainability must be closely aligned with its vision of being a safe and livable city, and with Ethiopia's national goals of becoming a middle-income country by 2025 and Africa's diplomatic capital. Over the next few decades, Addis Ababa's unprecedented urban growth could create the scale and agglomeration economies sufficient to enable the city to achieve its long-term goals; but if this growth is not well managed, it could also exacerbate existing risk factors and stresses related to natural hazards, access to basic services, and congestion.

The following diagnoses and recommended priority actions for Addis Ababa are organized along the USF's six dimensions and include some of its most important indicators. They demonstrate how struggling cities can build on diagnosis to prioritize actions that will increase sustainability, as Addis Ababa is doing through its Integrated Development Plan, currently in draft form. The content of this annex is adapted from World Bank (2015) and UN-Habitat (2017).

Enabling Dimensions

1. Governance and Integrated Urban Planning

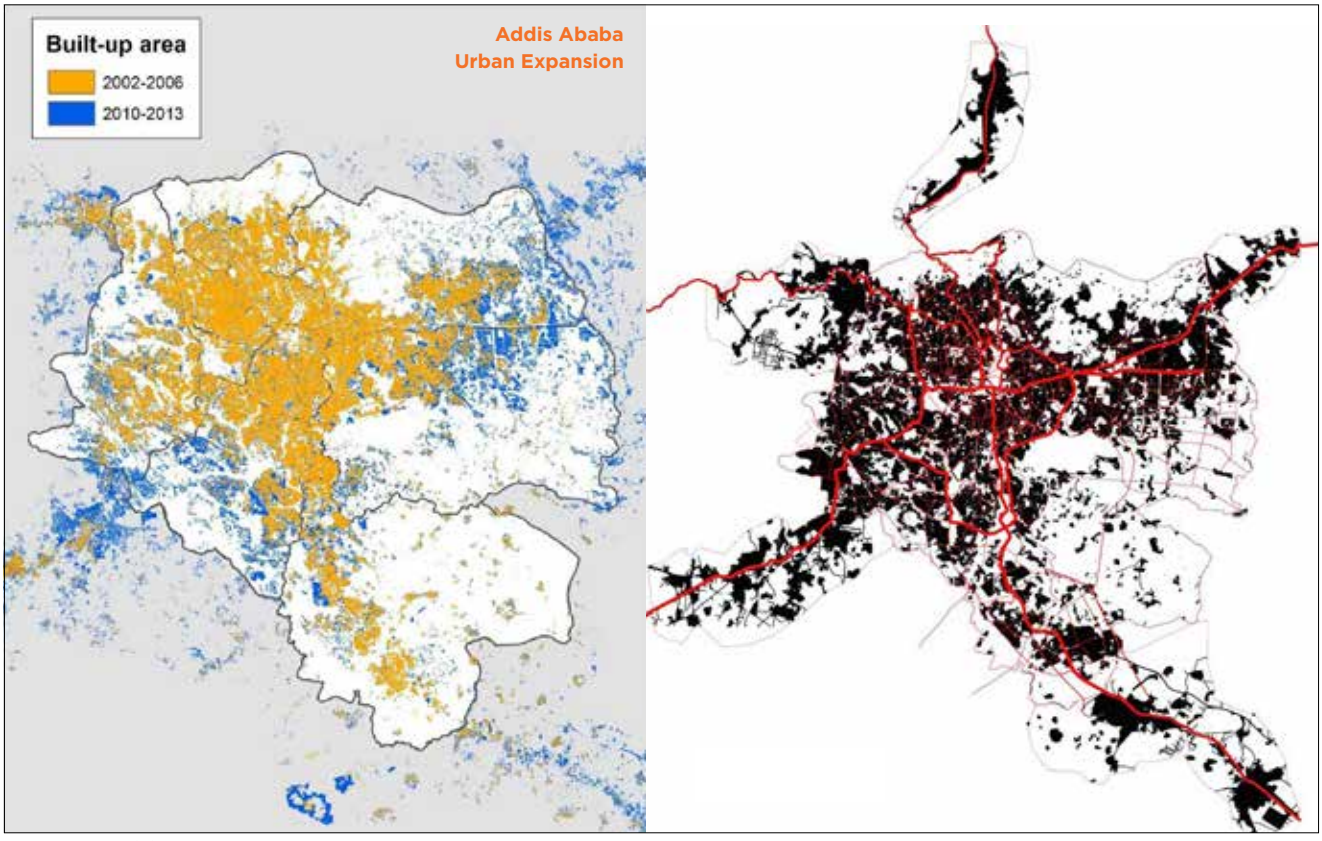
Diagnosis

The overall organization of the city government is complex, comprising agencies, authorities, and enterprises of the city and the federal government with a range of roles and responsibilities in the construction and management of infrastructure. This arrangement creates an important need for coordination. The draft development plan is quite comprehensive and technically sound. As in most cities, the challenge will be effective implementation of the plan and prioritization of project interventions (World Bank 2015).

Addis Ababa is urbanizing at an exponential rate and is expected to become a megacity of nearly 10 million people by 2037. This will put a strain on the city's ability to reach its goal of being a livable and safe city. Addis Ababa is sprawling; urban growth exceeds population growth. The result is that an estimated 46 percent of the land is vacant or underutilized. However, the city center has an extremely high density (up to 30,000 inhabitants per km^2), concentrating about 30 percent of the population on 8 percent of the land, usually with poor living conditions.

Addis Ababa's expansion along its five radial roads (figure 29) has posed many challenges for the city, including increased transportation costs, congestion, and provision of public infrastructure services. In addition, there is a lack of coordination between investment in transport and urban development. Decisions on housing location and land use planning are made based on the availability of land resources without assessing the impacts on transportation; this approach misses the opportunity to integrate public transport modes in terms of coverage, routes, fares, schedules, and equipment. Low street coverage and lack of road network and related infrastructure have led to increased inefficiency in mobility, with implications for productivity, quality of life, and social inclusion.

Figure 29. Addis Ababa Urban Expansion (left) and Fragmented Growth along Roads (right)



Source: World Bank 2015.

Priority Actions for Addis Ababa

- Address exponential urban growth by rapidly focusing on the implementation of the new Integrated Development Plan.
- Create an implementation "business plan" that articulates the phasing of works, costs and financing sources, and roles and responsibilities.
- Develop a strong communication plan that engages the participation of a wide range of stakeholders, including nonstate organizations.
- Improve transparency and accountability mechanisms by creating a website for the dissemination of public information, tracking and providing updates on the progress of the plan.
- Use a transit-based development approach for intensification: as part of the implementation of the Integrated Development Plan, the municipal government should select targeted sites for intensive public investment, private sector engagement, and institutional coordination. Investments in transport, especially public transport, should be supported by interagency technical teams to ensure the quality of local development.
- Shape metropolitan growth with transit corridors: efforts must be made to ensure that fringe growth is orderly and that there are viable and affordable transportation options.
- Ensure a balanced concentration between downtown and outlying areas.

2. Fiscal Sustainability

Diagnosis

Addis Ababa's ability to generate income needs to be better aligned with urban economic activity. The city faces the challenge of increasing municipal revenues to finance public spending. Current public spending in the city is far too much dependent on state revenues and subsidies, with the share of municipal revenues declining over time.

Priority Actions for Addis Ababa

- Improve the revenue-generating capacity of the city.
- Improve tax collection.
- Explore other forms of resource mobilization, including attracting more domestic and foreign investment by improving the business environment.

Outcome Dimensions

1. Urban Economies

Diagnosis

Addis Ababa is home to 25 percent of the urban population in Ethiopia and is one of the fastest-growing cities in Africa. It is the engine of growth for Ethiopia and a major pillar of the country's vision of becoming a middle-income, carbon-neutral, and resilient economy by 2025. Addis Ababa's economy grows every year by approximately 14 percent. The city currently contributes approximately 50 percent of the national GDP; this large share highlights Addis Ababa's strategic role within the overall economic development of the country.

Despite the efforts of the federal government and the city administration to diversify the economic base of the capital, the service sector remains dominant and the pace of manufacturing growth has remained slow (with some improvement over the past five years). Although the city government has made a significant effort to enhance local economic development through micro and small enterprise (MSE) development, it has yet to demonstrate the potential of MSEs in producing broad-based inclusive sustainable economic growth. As a result, the urban economy does not offer a sufficiently wide range of employment opportunities for different skill levels.

Addis Ababa was ranked 121st from among 125 cities surveyed in the "Global Cities 2016"

competitiveness report, better only than Dhaka, Khartoum, Lagos, and Luanda (A. T. Kearney 2016). In the Doing Business 2016 report, Ethiopia ranks 146th among 189 economies surveyed for ease of doing business (World Bank 2016). Starting a business, obtaining credit, trading across borders, and registering property were found to be critical impediments to doing business in Ethiopia. These factors have adversely affected inward foreign direct investment flows into Ethiopia and specifically into Addis Ababa.

Thus, despite its strong economic growth, Addis Ababa faces significant challenges. For example, levels of unemployment and poverty in Addis Ababa remain high, estimated at 23.5 percent and 22 percent respectively. More than one in four households report an unemployed adult, compared to one in 10 households in other urban areas in Ethiopia; and the informal sector employs about 30 percent of the economically active labor force in the city.

Priority Actions for Addis Ababa

- Build on recent gains by improving the efficiency, effectiveness, and responsiveness of municipal institutions in service delivery.
- Ease the cost of doing business by undertaking deep reforms to facilitate access to land, credit, and investable capital, and by eliminating bureaucratic red tape and corruption.
- Develop MSE linkages with medium and large enterprises. Government support is needed to enhance skills and finance for MSEs, and MSEs also need national and international market linkages, technology transfers, and subcontracting arrangements.

2. Natural Environment and Resources

Diagnosis

Air and water pollution currently exceed acceptable standards, with negative consequences for ecosystems and for the health of city residents. Neighborhoods accommodating the more vulnerable communities have the least access to green areas and fewest benefits of an adequate ecosystem.
Addis Ababa is already suffering from water scarcity, and this is expected to become even more significant due to rapid urbanization, increased individual water demand as incomes rise, and the impacts of climate change. Currently, Addis Ababa has two sources of water—surface water and groundwater—and failure of either would result in a crisis. To ensure that more potable water is made available to the population and address the estimated 36.5 percent leakage of water supply in the system, Addis Ababa must improve maintenance and respond more quickly to reported breakages. The per capita distribution is estimated to be around 40 liters/day, well below the city's goal of 110 liters/day.

Priority Actions for Addis Ababa

- Reduce the transaction cost associated with environmental degradation by expediting the implementation of existing laws and regulations on pollution control and energy efficiency.
- Introduce best practices for solid waste such as waste separation, compost production, and recycling and reuse.
- Tackle water pollution by regulating and controlling discharges from both houses and factories.
- Address water scarcity by focusing on improved efficiency and protection of the existing supply system, management of demand, and identification of additional water sources.

3. Climate Action and Resilience

Diagnosis

The climate of Addis Ababa is forecasted to have an increase in precipitation variability and temperature. This will likely exacerbate a wide range of hazards in the city, including flooding and landslides as well as droughts and fires (which have been the most common hazards in rural and urban areas). The geographic location and topographic features of Addis Ababa, compounded by the existing state of the drainage system, road network, and sewerage system, expose the city to street and riverine flooding as well as landslides. There are limited awareness-raising activities and no early warning system in place, meaning that communities are highly vulnerable.

Priority Actions for Addis Ababa

By improving coordination between municipal services, Addis Ababa's government could implement a set of initiatives that would transform the resilience of the city and bring many economic, social, and environmental benefits:

- Implement existing plans and regulations;
- Establish clear and competent leadership in risk management, including the creation of a risk management unit under the authority of the mayor to strengthen, promote, and integrate risk management initiatives in municipal organizations;
- Strengthen citizen engagement in disaster risk management by leveraging informal initiatives and strengthening formal ones—this will also serve to make existing engagements more efficient; and
- Establish a functioning neighborhood-level early warning system for residential areas along rivers and in densely populated zones for flood safety.

4. Inclusivity and Quality of Life

Diagnosis

The Gini coefficient (which measures income inequality) rose in Addis Ababa between 1996 and 2005, from 0.353 to 0.455. After 2005, the Gini coefficient started to decline, and in 2015 it stood at 0.342.

Addis Ababa's 80 percent level of literacy is higher than that of other parts of the country. In addition to impressive achievement in school enrollment at all levels, the city has also shown significant improvement in educational infrastructure, which has in turn improved access to education.

However, the provision of housing and infrastructure, which underpins urban economic productivity and social inclusiveness, is significantly lagging, despite the major investments being made by the city. Of total housing stock, 70–80 percent is of low quality. It is estimated that only 44 percent of the population have access to clean water, and only 25–30 percent of households have wastewater collection, either through piped sewer lines or vacuum trucks. Treatment capacity is currently exceeded, and excess waste is deposited in water bodies. The city's electricity access rate is close to 100 percent, but energy service disruptions—outages and interruptions—are very frequent and a stress to the city. The projected rapid growth in population and intensity of urbanization will require an increase in generation capacity and an efficient transmission and distribution system.

Existing poverty alleviation programs are fragmented and ineffectively targeted, with very low coverage. The national food poverty head count index is 33.6 percent on average (34.7 percent in rural areas and 27.9 percent in urban areas). Currently, the most

vulnerable groups in Addis Ababa cannot benefit from many of the social services available because they cannot access or afford them. Analysis is needed to better understand vulnerable groups in the population and to develop an integrated strategy that will provide them with appropriate support consistent with the overall government agenda.

Priority Actions for Addis Ababa

- Develop an inclusive housing strategy, including a review of household affordability and the on- and off-budget subsidies associated with the city's condominium program; incorporate a wider range of options beyond ownership of condominium housing units (i.e., rental housing, housing upgrading, housing cooperatives, etc.) and expand affordable housing finance.
- Increase coverage and reliability of basic services, including wastewater collection and treatment and energy distribution.
- Undertake an in-depth study of the most vulnerable groups (with special attention to existing social service programs and access to housing) to develop an integrated strategy to meet their needs.
- Put in place a safety net and targeted complementary livelihood actions to support extremely poor and vulnerable groups and households.

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